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PHASE II
Final Recommended Requirements to Resolve BLM/QTC Trans-Alaska Pipeline System (TAPS) PHASE I Audit Deficiencies

January 5, 1994

Prepared by
Owen L. Thero, President
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for

Bureau Of Land Management (BLM)
Washington, D. C.

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January 5, 1994

VIA FEDERAL EXPRESS

Dr. Jeffrey F. Zabler
Senior Projects Manager
c/o Public Affairs Office
Room 5600
Bureau of Land Management (BLM)
U. S. Department of Interior
1849 C St., N. W., Room 2444
Washington, D.C. 20240

Dear Dr. Zabler:

Subject: Phase II Final Recommended Requirements to Resolve BLM/QTC Trans-Alaska Pipeline System (TAPS) Phase I Audit Deficiencies

Reference 1: Contract No. 1422P852-C3-0014, Modification No. 3

Reference 2: Phase I Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC)

The Quality Technology Company (QTC) is pleased to submit its enclosed subject Final Phase II Report to the Reference 1 BLM/QTC Contract. The recommended requirements included in this final report present those minimum requisite process, program, and hardware actions necessary for Alyeska and the owners to develop, maintain, and implement in order to completely address, resolve, and prevent recurrence of the QTC findings reported in its Reference 2 TAPS audit report.

It is of primary importance to the health and safety of the public, the environment, and the ecosystem for Alyeska and the owners to reestablish the integrity of the TAPS by gaining control of the safety margin of its quality-related structures, systems, components, and programs through a total and disciplined approach to project quality.

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January 5, 1994

Dr. Jeffrey F. Zabler
Senior Projects Manager
Bureau of Land Management (BLM)
Washington, D. C.

Owen L. Thero, President
Quality Technology Company (QTC)
Lebo, Kansas

It has been a pleasure for QTC to serve the Bureau of Land Management in this most dynamic, important, and strategic effort.

Respectfully submitted,

QUALITY TECHNOLOGY COMPANY (QTC)

Owen L. Thero

Owen L. Thero
President

Attachment: Phase II Final Recommended Requirements to Resolve BLM/QTC Trans-Alaska Pipeline System (TAPS) Phase I Audit Deficiencies by Quality Technology Company (QTC) (original and 25 copies)

cc: Rob McWhorter (with 25 copies of Report)
Project Inspector, Public Affairs Office
Bureau of Land Management (BLM)
U. S. Department of Interior
222 W. 7th Ave., 4th Floor
Anchorage, Alaska 99513-7599

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State Pipeline Coordinator's Office, ltr - 93-180-M, dtd December 29, 1993
Alyeska Comments, Attachment 2, dtd December 31, 1993

INTRODUCTION

Reference: Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), Executive Summary pages 17, 21, 46, and 56; III.A.1; and VII.B.1.

In this Final Phase II report, QTC has developed recommended requirements and processes for the BLM which are intended to address and resolve the process, program, and technical hardware issues identified by QTC in its audit of the TAPS and resultant Phase I Final Report. The requirements recommended by QTC to resolve the Phase I audit findings are intended to encompass quality-related structures, systems, and components. Any other structures, systems, and components which are not included as part of the quality-related definition may be handled on a case-by-case basis as deemed appropriate by Alyeska.

This QTC Final Phase II report covers only those items requiring corrective action by Alyeska in order to address the issues in QTC's Phase I Final Audit Report. As a matter of clarification, the sub-issues or topics from Section XII of QTC's Phase I Report were addressed in the Executive Summary of the Phase I Report on pages 17, 59, 60, and 61, and in the Matrix attached to the Highlights section of the report. Those issues requiring quality assurance program resolution were, in addition, discussed in Section XI.B.13 of the Phase I report, as was identified in the Index.

It should be specifically noted that this report in no way should be construed as supplanting, or contradicting any federal, state, local, or other applicable laws, regulations, agreements, or requirements imposed upon Alyeska. To the contrary, Alyeska is absolutely expected to fully comply with all such laws, regulations, agreements, and requirements specified in the agreements granting right-of-way between the government and the TAPS owners (including specifically Section 9). This report clarifies already-existing laws, regulations, agreements, and requirements

only as necessary to address and resolve the numerous specific problems and concerns which have been identified to QTC in the original contract BLM scope of work (in Appendix A) from various sources regarding the pipeline and its past, present, and future operation.

In arriving at the recommended requirements and practices identified in the following sections of this report, QTC has developed a set of standards which incorporates sound industry standards of excellence and experience of the QTC team members from high tech industries such as the commercial nuclear power industry and the aerospace industry. QTC has also drawn some control aspects of the legal and regulatory requirements from these industries, which have been painstakingly developed over a period of many years at a high cost to those industries to develop and implement. Experience has shown that these industries and the country have benefited from applying such standards of excellence and lessons learned.

QTC, in compiling the process, program, and technical performance standards incorporated into this report has gone to more detail than might normally be called for, in order to assure that Alyeska and the regulatory agencies comprising the BLM/JPO recognize the breadth and scope of the processes and programs necessary to properly address, implement, and resolve the Phase I audit findings. Although in this report QTC has extensively referenced specific Sections of QA Manual 36, Revision 7, QTC has not attempted to rewrite any or all portions of Alyeska's QA Program Manual or any resultant tier two, three, or four defining documents stemming from Alyeska's QA Manual. QTC has, however, developed and defined in this report to the BLM those minimum hardware and programmatic recommended requirements found necessary to be incorporated into Alyeska's quality assurance program in order to resolve QTC's Phase I audit issues, and to meet the letter and intent of the TAPS agreements and right-of-way.

In implementing the means of meeting the requirements which QTC has developed, conflicts in specific form, language, and response may develop. In each such instance, Alyeska shall detail the ?
conflicting requirements and petition the controlling regulatory agency for resolution.

QTC, in developing its report, has not identified any practice or course of action the implementation of which presents a major economic burden or technical difficulty within the relative context of the scale and scope of operations of TAPS and the owner companies. QTC has also in its report developed the practices and courses of action in a manner which facilitates their implementation, and subsequent monitoring and regulation.

In QTC's review of industry-wide programmatic standards, QTC has reviewed such documents as ISO 9000, and in QTC's assessment, although this document is an acceptable commercial-grade standard, it is not sufficient for the resolution of the process, program, and technical problems identified by QTC in its audit of the TAPS. Likewise, QTC reviewed NQA-1 and found that standard will not address and resolve or prevent the kinds of process, program, and technical issues identified by QTC in its Phase I report. QTC has, however, in extracting key elements from documents such as: ISO 9000; NQA-1; 10 CFR Part 50, Appendix B; ANSI N45.2 and its daughter standards; OSHA 29 CFR Part 1910; and MIL-Q-9858A, as well as some aspects of the Corrective Action Program implemented by Texas Utilities Electric Company to resolve similar quality and programmatic issues at its Comanche Peak nuclear power station, reviewed options and variations when compared to the risks identified in the Final Audit Report.

During the review process for this report, QTC has examined and given consideration to numerous options and variations when compared to the risks to the health and safety of the public and the environment/ecosystem. QTC can therefore, with high confidence, assure the BLM/JPO, Congress, and the public that Alyeska's prompt and effective development, implementation, and maintenance of the programs detailed herein, when coupled with proper oversight from the BLM/JPO, will result in the issues identified by QTC in its final report being resolved, resulting in more efficient, cost-effective, and safe operation of the pipeline in the future.

CORRECTIVE ACTION PRIORITIES

The corrective action program required to address and resolve the QTC Phase I findings and bring the Alyeska pipeline system, including hardware and programs, into compliance with the right-of-way agreements mandating the protection of the public health, safety, environment, and ecosystem, consists of four distinct tasks:

1) Design Verification and Validation;
2) Programmatic Enhancements;
3) Interim Programs, Process Control, and Work Control; and,
4) Remedial Action.

1. Design Verification and Validation

Design verification and validation includes determination of the design requirements and validation of the existing design, establishment of the as-built condition, and review to identify discrepancies between the validated design and the as-built condition. Modifications are performed under the remedial action section to bring the project into accord with the validated design. The process and controls required to carry out this task are described in detail in the balance of the report, notably in Section 7, Design Control, and Section 2, Quality Program Description.

This task encompasses the design verification and validation for the project and includes, among others, the following distinct sub-tasks:

1) electrical system integrity, design verification and validation;
2) NEC compliance project, design verification and validation;
3) mainline pipe girth welds, design verification and validation;
4) non-mainline pipe supports, design verification and validation;
5) vertical support members, design verification and validation; and,
6) the as-built condition of the quality-related items of the project.

2. **Programmatic Enhancements**

Programmatic enhancements include the incorporation of the detail and requirements in this report into controlled Alyeska programs and processes utilizing procedures, drawings, instructions, and other applicable methods. This process assures that adequate controls exist and that requirements are translated and presented in Alyeska's quality assurance program and implementing procedures so that the day-to-day activities of Alyeska will be in compliance with the Agreement and Grant of Right-of-Way for the Trans-Alaska Pipeline Between the United States of America and the Owner Companies.

This task includes, among others, the following distinct sub-task enhancements:

1) QA-36 and QA-92 procedures;
2) departmental implementing procedures;
3) document control system;
4) records retention system;
5) maintenance program and preventive maintenance (PM) procedures
6) training;
7) master equipment list (MEL);
8) Q list;
9) precision measuring and test equipment (PM&TE) program;
10) regulatory compliance matrix;
11) inspection program;
12) safety and environmental surveillance programs;
13) associated computer software systems; and
14) facility upgrade to support additional personnel.

3. **Interim Programs, Process Control, and Work Control**

Interim programs and controls will be necessary to allow work to continue under existing requirements and the requirements of this report while the revised program is being developed and implemented. The individuals involved in this process shall be trained and

qualified to existing requirements as well as requirements presented in this report. The interim programs group will be a multi-disciplined team and maintain a near-constant interface with the design verification and validation task, the programmatic task, and the remedial action task, assuring that activities are being performed in accordance with existing requirements and requirements presented in this report.

4. Remedial Action

The remedial action task will generally implement the modifications required to bring the project into compliance with the requirements, including existing requirements and those presented in this report. These projects will be headed by members of the interim program groups. At this time, the most extensive modifications, as well as the ones with the highest priority, are the seismic modifications. They include, among others, the cabling, cable trays and conduits, and vertical support member touch points. These are presented in more detail later in this report.

The identified actions include, among others, corrections of hardware deficiencies involving:

1) electrical system integrity; ✓
2) NEC compliance; ✓
3) mainline pipe girth welds; ✓
4) non-mainline pipe supports; and, ✓
5) vertical support members. ✓

UPGRADING THE ELECTRICAL SYSTEM TO ITS REQUIREMENTS

The establishment of the credibility and integrity of the TAPS electrical system must be accomplished by performing design validation and verification, including repairs and upgrading of the entire TAPS electrical system. This design verification and upgrading program shall include the establishment of the completeness of its associated documentation which is required for a complex and extensive set of reasons. They vary in seriousness from simple housekeeping and

maintenance to the avoidance of a Class 1 Imminent Threat. The BLM audit team identified and reported problems with power cables and supports, signal and alarm system cables as well as their cabinets and terminations, and extensive inadequacies in the documentation of the electrical system.

Some of the problems with the electrical system were generated by the first installation, for example, cable supports and as-built documentation. Some are the results of what were intended to be modifications and improvements to the TAPS but which had unanticipated or unrecognized adverse effects as well, e.g., overloaded cable trays and inadequate supports and tie-downs. Others have come about because of poor workmanship in repair and replacement, e.g., signal wire terminations and cabinet placement.

In the many years of successful operation of the TAPS, the in-service record has been very good. The total number of failures has been small, and the overall performance of the electrical system has been exemplary. With this outstanding record of success, the need for an extensive, comprehensive, and expensive electrical system retrofit program raises immediate questions of cost versus safety and necessity.

An engineering design review, reinspection, and retrofit program of the TAPS electrical system is required for three major reasons. The first, and most critical, reason is that the impact of a design basis earthquake on the overall TAPS performance appears to be so destructive that not only might pipeline operation shut down unpredictably and require weeks to restart, but even worse, that significant damage to the pipeline could occur which could result in massive oil spills, massive destruction, fires, loss of life, and/or contamination of the environment/ecosystem. The second reason is that the system is aging but has little or no as-built and as-maintained documentation of its safety margins, or configuration, with the consequence that the expectation of continued long-term satisfactory operation without untoward consequences cannot be predicted confidently. The third reason is that the configuration of the electrical system is not in conformance with the requirements of the TAPS right-of-way agreements and their derivative

requirements, e.g., the requirement that the system conform to applicable codes, including the National Electrical Code (NEC).

In each of the subsequent descriptions included herein and in the body of this report, major quality assurance functions are identified. These are described in other parts of this report where the necessary upgrades to the Alyeska quality assurance program and to Quality Assurance Manual QA-36 are discussed. All such upgraded quality assurance programmatic and control functions shall be included in the program. More specifically, the criteria which the electrical system must meet shall be documented and detailed at the start of the program. Included shall be the overall TAPS right-of-way requirements, e.g., the Richter levels applicable at various places along the pipeline and the levels of structural strength, motion control, and device damping which derive from the Richter requirement. Another broad requirement is referred to as the NEC. This code has many applicable paragraphs.

These, in turn, must be translated into inspection requirements so that an engineering analysis of the in-place system elements can be made. In addition to determining repairs to be made, inspection results shall be used to determine the requirements for redesign of some parts of the electrical system. This is an engineering design analysis function which shall result in controlled documents which define modifications to the existing hardware and software. Quality assurance provisions which define and control this work shall be described in the upgraded QA manual and in lower-tier documents. After installation, as-built inspections shall be performed to engineering design and workmanship standards, and functional testing shall be performed prior to returning the system to operation. Test requirements, inspection criteria, and changes shall be performed as part of the design control process, again in conformance with quality assurance programmatic controls.

TAPS operations which are affected during and after the installation of any engineering modification shall require corresponding changes to the operating procedures and inspection and test procedures for those activities directly affected. Because of the extensive inter-operation of

most of the pipeline functions, there will be indirect effects which must be anticipated and described by operations personnel before modifications to the electrical system are implemented. This could include the design and installation of temporary modifications to support those activities. Particularly serious situations can occur when a subsystem or component is shut down or bypassed to implement an electrical changeover and the effect of that inoperative subsystem or component is translated as a pipeline failure by automatic sensing equipment the purpose of which is to deal safely with emergencies. Operations and engineering personnel familiar with pipeline control shall participate in the planning and implementation of electrical system modifications.

Final changes to the electrical system shall be made a part of the following documents, as a minimum: as-built drawings; as-built specifications; performance and maintenance criteria; test and maintenance procedures; inspection procedures; operations procedures; technical manuals; and safety procedures and manuals.

An integrated program plan defining the time basis of all the work to be accomplished, the degree of participation of all of the organizations involved, and the functional and time-based interactions with pipeline operations shall be detailed, developed, and approved. The requirements for manpower, qualifications and skills, and support functions must be included. From this total plan, the direct and indirect monetary costs can be constructed and approvals secured.

The BLM/QTC audit team briefly reviewed the program which was in process at the Valdez Marine Terminal to identify and correct electrical code deficiencies and violations. Much of that program was considered a strength. This NEC verification program shall be included in the overall program described herein, and elements, including as a minimum, workmanship and inspection criteria, as-built drawing revisions, and quality assurance verification added to it. This program should be folded into the larger program described herein, and elements (e.g., criteria definition, as-built drawing revision, and quality assurance conformance) added to it. Because the total program is extensive, a series of sub-programs should be derived and approved. An overall

analysis, description, and evaluation shall be included of the derivative plans and how, when fully accomplished, such plans fulfill the requirements of the total program.

QA-36, Section 1, Management Responsibilities

Reference: Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), Executive Summary, Mindset pages 11-15; Regulatory Requirements Matrix pages 15-16; Management pages 59-64;. XI.B.7, Management Controls pages 1-3.

In order to establish and maintain a high quality level for all quality-related activities being conducted at the Trans-Alaska Pipeline System (TAPS), Quality Technology Company (QTC) has developed an enhanced and comprehensive regulatory approach to a total Quality Assurance (QA) Program, as documented in Section 2 of this QTC report. The program requires, as a minimum, that all quality activities performed by Alyeska Pipeline Service Company (hereinafter referred to as Alyeska) and its contractors/vendors comply with the regulatory criteria agreed upon, as established in the Agreement and Grant of Right-of-Way for the Trans-Alaska Pipeline between the United States of America and the Owner Companies, dated January 23, 1974, Section 9, Construction Plans and Quality Assurance, as further clarified and enhanced by this section of this QTC report.

This report addresses the issues raised in the Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC). The requirements set forth in this report are intended not only to help assure that past and present problems and concerns are promptly and adequately addressed and resolved, but also to establish programmatic controls and processes which, when properly implemented, will assist in preventing such problems and concerns in the future and assure the continued future operation of the pipeline in a safe and environmentally sound manner. It is QTC's firm belief that prompt actions such as those identified in this report will also assist in assuring more reliable, efficient, and cost-effective operation in the future by avoidance of problems (some of which QTC considers to be imminent threats), as well as assisting in reestablishing the confidence of the public, legislators, and regulators in Alyeska and the owners, and ultimately benefiting the entire country.

The authorities for such action and requirements by the U. S. Interior Department's Bureau of Land Management (BLM) are well-established and well-known, and will not all be repeated here. ? One such authority is the National Environmental Policy Act of 1969 (NEPA) (83 Stat. 852), implemented by Executive Order 11514 and the Council on Environmental Quality's Guidelines of August 1, 1973 (38 FR 20550). One of the principal objectives of NEPA is to require all agencies of the Federal Government to consider in specific detail all proposed and/or implemented major Federal actions which can significantly affect the quality of the human environment and to assure that the environmental impacts of each proposed and/or implemented major action and the available alternative actions do not adversely impact the health and safety of the public or the environment/ecosystem. NEPA requirements are designed to assure that the impacts of operation of the facility are, to the fullest extent practicable, quantified and systematically presented.

Other authorities for regulatory action by the BLM could be cited, and if necessary, additional regulatory action called for; however, it is QTC's assessment that this is unnecessary for the purposes of this report and the actions called for in it, and QTC is not calling for new regulations in this report. Throughout this report, the term "regulatory requirements" should be interpreted to mean already-in-place and already-in-effect requirements or agreements, and clarifications or enhancements to such requirements or agreements. It is QTC's assessment that authority for the recommended requirements and enhancements proposed by QTC in this report is already contained in the Agreement and Grant of Right-of-Way for the Trans-Alaska Pipeline between the United States of America and the Owner Companies, dated January 23, 1974. More specifically, this document states, in Section 9, Construction Plans and Quality Assurance:

> "A. Permittees shall submit construction (including design) plans, a quality assurance program, and other related documents as deemed necessary by the Authorized Officer, for review and approval prior to his issuing Notices to Proceed.
>
> "B. The quality assurance program shall be comprehensive and designed to assure that the environmental and technical Stipulations in the Agreement will be fully complied with throughout all phases of construction, operation, maintenance and termination of the Pipeline System.

"C. The following criteria shall be included in the quality assurance program, although Permittees are not limited to these criteria:

"(1) Provide adequate and appropriate means and procedures for the detection and prompt abatement of any actual or potential condition that is susceptible to abatement by Permittees which arises out of, or could affect adversely, the construction, operation, maintenance or termination of all or any part of the Pipeline System and which at any time may cause or threaten to cause: (a) a hazard to the safety of workers or to public health or safety (including but not limited to personal injury or loss of life with respect to any person or persons) or (b) serious and irreparable harm or damage to the environment (including but not limited to areas of vegetation or timber, fish or other wildlife populations, or their habitats, or any other natural resource).

"(2) Provide adequate and appropriate means and procedures for the repair and replacement of improved or tangible property and the rehabilitation of natural resources (including but not limited to revegetation, restocking fish or other wildlife populations and reestablishing their habitats) that shall be seriously damaged or destroyed if the immediate cause of the damage or destruction arises in connection with, or results from, the construction, operation, maintenance or termination of all or any part of the Pipeline System.

"(3) Provide for component and systems quality through adequate quality control management and planning, and inspection and test procedures.

"(4) Assure that the selection of Permittees' contractors, subcontractors and contract purchases of materials and services are based upon the above quality control procedures.

"(5) Determine quality performance by conducting surveys and field inspections of all of the facilities of Permittees' contractors and subcontractors.

"(6) Maintain quality determination records on all of the above procedures to insure satisfactory data identification and retrieval."

QTC, when appropriate, has incorporated some essential elements of regulatory or safety guides into this report which originated outside the oil pipeline industry. The pipeline is an extraordinary endeavor and operation, and deserves and requires specialized expanded regulatory

oversight and requirements which recognize not only the current issues under consideration, but the truly unique place it holds in the environmental and economic life and future of this country. QTC has therefore also included in this report requirements based upon the background and experience of the audit team members in resolving similar conditions encountered in other industries. This merging of criteria is intended to further clarify and enhance the requirements established in the TAPS Agreement and to focus Alyeska management attention on prevention rather than on appraisal or activities to correct defects.

It is recommended to the BLM that Alyeska be required to incorporate the requirements in this report into the Quality Program Manual, QA-36, and/or the appropriate sub-tier standards, implementing procedures, instructions, or checklists, and to provide references to the written policies, procedures, and instructions used to implement the QA Program throughout the TAPS for which Alyeska provides service.

MANAGEMENT CONTROLS AND PROGRAM

Alyeska, as the responsible agent for the overall management and operation of the TAPS, shall develop and implement a management control program which focuses on proactive prevention activities rather than on reactive appraisal and defects identification. This program shall encompass all quality-related activities as a minimum. It shall provide a systematic method for:

1) identifying and implementing recommended regulatory requirements and changes thereto;
2) identifying and implementing process, system, and equipment requirements and changes thereto;
3) identifying and defining all functional areas responsible for implementing each of these requirements;
4) defining and implementing guidance and requirements for the management of each functional area;
5) assuring that policies, procedures, and instructions for controlling the activities in each functional area are adequate;

6) assuring that the policies, procedures, and instructions for controlling the activities in each functional area are adequately implemented and include appropriate documentation;

7) assuring that the individuals who have been assigned responsibilities in each functional area understand their responsibilities; and,

8) assuring that individuals with responsibilities in each functional area are adequately qualified, and when required certified, to perform their activities and have been adequately trained to achieve, and retrained to maintain, their qualification/ certification levels.

1. Responsibility

The Quality, Environment, and Safety Organization, under the direction of the Vice-President of Quality, Environment, and Safety, shall be established and function to assure effective implementation of the quality assurance program.

The Vice-President of Quality, Environment, and Safety shall report directly to the President of Alyeska and shall be responsible to him for assuring effective and efficient implementation of the Quality Assurance Program. This reporting relationship shall assure that the Vice-President of Quality, Environment, and Safety has sufficient authority, organizational freedom, and independence from undue influence from, or responsibility for, costs and schedules, such that he/she can effectively assure implementation of, and compliance with, the TAPS quality assurance requirements and controls.

The Vice-President of Quality, Environment, and Safety shall be responsible for submitting the Alyeska TAPS Quality Assurance Manual for concurrence and approval to the President of Alyeska. The Vice-President of Quality, Environment, and Safety shall be responsible for the verification and compliance of quality assurance activities in support of the TAPS operation.

The Vice-President of Quality, Environment, and Safety shall communicate with the TAPS functional management and supervisory personnel and with appropriate management levels in consultant, supplier, and contractor quality assurance organizations to: identify quality problems; initiate, recommend, or provide solutions; and to verify implementation of solutions to quality problems. The Vice-President of Quality, Environment, and Safety shall also have the authority to "stop work" during any phase of the TAPS activities.

Specific duties and responsibilities of the Vice-President of Quality, Environment, and Safety shall include the following:

1) direction of the Alyeska TAPS Quality, Environment, and Safety group;
2) technical and administrative direction of:
    a) manager of quality assurance;
    b) manager of inspection services;
    c) manager of plant analysis; and
    d) manager of training;
3) verification through audit, surveillance, and review that TAPS project procedures are in compliance with quality assurance requirements;
4) verification through audit and surveillance of the implementation of the TAPS project quality assurance program and evaluation of its effectiveness; and,
5) assurance through audit, surveillance, inspection, examination, and test that contractors and suppliers providing quality-related items or services have established and implemented an adequate quality assurance program.

Alyeska senior management shall be responsible for the identification, implementation, and follow-up of these quality assurance programmatic activities as they apply to their functional responsibilities, including the performance of self-assessments of the activities. These activities shall be described in controlled policies, procedures, and instructions. The quality assurance organization shall be responsible for assuring and verifying that these identifications, implementations, follow-up self-assessment activities, and procedures

are effective, incorporate and meet Alyeska's recommended regulatory requirements, and are adequate prior to and during their implementation. The quality assurance organization shall assure fulfillment of such responsibilities, in part, by conducting audits and surveillances.

2. Quality, Environment, and Safety Organization

Specific quality assurance program functions performed by the Quality, Environment, and Safety Organization shall include, as appropriate based upon Q level of item:

1) review and evaluation of functional organizations' incorporation of quality assurance program requirements into implementing specifications, drawings, procedures, and instructions;
2) quality assurance auditing and surveillance of TAPS quality-related activities;
3) review and evaluation of contractors' and suppliers' quality assurance programs and implementing procedures;
4) quality assurance auditing and surveillance of contractors and suppliers;
5) for items which are on the Q list, surveillance and source inspection conducted at equipment and material suppliers' facilities;
6) review of procurement documents to assure incorporation of adequate quality assurance requirements for procured items and services;
7) general inspection and nondestructive examination of TAPS quality-related activities to assure compliance with the applicable quality requirements;
8) development and implementation of the TAPS environmental program to assure implementation of regulatory environmental requirements;
9) development and implementation of the TAPS safety program to assure implementation of regulatory safety requirements;
10) development and implementation of the TAPS trending program;
11) development and implementation of the TAPS root cause analysis program; and
12) development and implementation of the TAPS training program.

3. Regulatory Requirements Matrix

Alyeska shall develop a controlled regulatory requirements matrix and a controlled mechanism to assure that the matrix and affected elements are updated in a timely fashion when new requirements are defined or requirements are revised or otherwise changed. The quality assurance organization shall develop and implement controlled methods to assure that this matrix and the controlled update mechanism are accurate and adequate. This matrix shall:

1) be controlled;
2) contain all of the regulatory requirements and their elements to which Alyeska is committed in the TAPS agreements and may contain other requirements as Alyeska chooses;
3) provide a specific reference for the invoking document for each requirement;
4) provide a specific reference to the requirement itself;
5) provide a brief description of each element of the requirement;
6) provide a specific reference (location, name, etc.) to the functional organization(s) responsible for implementing the requirement;
7) provide a specific reference (location, name, etc.) to the functional group(s) responsible for implementing the requirement; and,
8) provide a specific reference (title, revision, date, page, paragraph, etc.) to the Alyeska controlled procedure(s) or instruction(s) that fulfills the element of the requirement.

Alyeska may elect to maintain this matrix in an electronic relational database format provided that control, access, and security is sufficient to meet document and work control requirements.

4. Functional Areas and Functional Management

Alyeska shall identify in controlled procedures all functional areas and the functional management responsible for implementing the regulatory requirements and the processes, systems, and functions utilized to fulfill these requirements which are quality-related. The

quality assurance organization shall develop controlled measures to assure that these procedures are adequate for the task, include provisions for preventing deficient conditions from occurring, and are implemented.

5. **Functional Area Management Requirements**

Alyeska shall develop, define, and implement specific requirements and qualifications for managing functional areas which are quality-related. They shall also develop and implement specific guidance for managing each functional area. The requirements and guidance shall describe appropriate preventative techniques for use in managing each functional area. The quality assurance organization shall develop controlled measures to assure that these requirements and guidance are adequate and adequately implemented for each functional area.

6. **Functional Area Procedures, Instructions, and Documentation**

The quality assurance organization shall develop controlled measures to assure that quality-related procedures and instructions for controlling the activities in each functional area:

1) exist;
2) are controlled;
3) are adequate for the task;
4) are adequately implemented; and
5) include appropriate documentation.

7. **Individual Responsibilities in Functional Areas**

The quality assurance organization shall develop controlled measures to assure that individuals who perform quality-related activities in each functional area:

1) understand their responsibilities;
2) are adequately qualified to perform their activities;

3) have been adequately trained to achieve their qualification level; and
4) have been adequately retrained to maintain their qualification level; or have had their proficiency monitored, documented, and determined to meet their qualification level.

QA-36, Section 2, Quality Program Description

Reference: Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), Executive Summary pages 19, 25, 59, and 60; XI.A.1 pages 3, 4, 21, 30, 31, 32, and 34; XI.A.3 page 3; XI.A.4 pages 1-8; XI.B.3 page 1; XI.B.5 pages 4, 5, 6, 9, and 10; XI.B.6 pages 5 and 7; XI.B.7 pages 1 and 2; XI.B.9 page 1; XI.B.10 page 2; XI.B.11 page 1; XI.B.13 pages 1-26; XI.B.14 pages 5 and 7; XI.B.16 page 3; and XI.D. page 3.

CLARIFICATIONS AND ENHANCEMENTS OF CURRENT QUALITY PROGRAM

The Alyeska quality assurance program shall include the following:

1. General Requirements

The general requirements of the quality assurance program shall, as a minimum, specify that:

> The quality assurance program provides requirements and management for the establishment and execution of a quality assurance program covering the design, construction, operation, and inspection of quality-related structures, systems, and components of the TAPS. Quality-related items require specific considerations during design, purchasing, fabrication, handling, shipment, storage, cleaning, erection, installation, inspection, testing, operation, training, maintenance, repair, calibration, and modification. These items include TAPS structures, systems, and components, or portions thereof, which prevent or mitigate the consequences of accidents or natural events such as earthquake/seismic occurrences which could cause undue risk to safety, pipeline integrity, or the environment/ecosystem.

2. Program Documents

2.1 Implementing Procedures and Instructions

Activities affecting TAPS quality-related structures, systems, or components, whether hardware-related or programmatic, shall be detailed in implementing procedures or instructions. The activities prescribed in these procedures or

instructions shall be accomplished in accordance with these approved documents. The implementing procedures or instructions shall include regulatory requirements, codes, and standards as translated into quantitative or qualitative criteria for determining that all quality-related activities have been satisfactorily and completely accomplished and are verifiable.

The activities shall be prescribed in various forms including, as a minimum, engineering specifications, technical bulletins, maintenance and calibration instructions, as-built drawings, work orders, planning sheets and checklists, operating or procedure manuals, standard operating procedures, test procedures, inspection procedures, or any other type of written form, provided that the activity is adequately described and approved. Quantitative criteria, such as dimensions, tolerances, and operating limits, and qualitative criteria, such as workmanship standards and comparative workmanship sample/shop aids, shall be specified for determining satisfactory work performance and quality compliance.

These documents shall be maintained current, revised as necessary, controlled, and issued to assure that programmatic (process and program), installation, modification, inspections, maintenance, and tests are performed in accordance with the latest approved engineering definition and information.

Installation, modification, inspection, test and operating procedures and instructions shall include, as a minimum, the following:

1) Prerequisites, such as: qualification/certification of individuals, organizations, and procedures; that systems have been designed and meet the latest engineering definition/document control status for that document; that materials have been selected and equipment has been fabricated and assembled in accordance with as-built design specifications, drawings, codes and standards, the conformance to which has been demonstrated by

the responsible organization; that engineering limitations have been incorporated into the procedures and instructions. These limitations and requirements shall include, as a minimum, installation, testing, on-site fabrication processing such as cleaning, welding, nondestructive examination, and parameters such as pressure, flow, temperature, speed, load limits (static and dynamic), travel limits, physical clearance, electrical and fire separation, control and alarm settings, environmental limits which are included in design specifications, manufacturer's data sheets, instruction manual and design reports;

2) to allow for verification of the above, the following types of documents, as a minimum, relating to the specific stage of installation/modification activity for the item shall be available at the user location:

   a) the latest as-built approved/controlled specification(s) and drawing(s);
   b) manufacturer's/vendor's installation instructions;
   c) installation and inspection/test procedures;
   d) evidence of traceability and compliance by the manufacturer/vendor with purchase order requirements including quality assurance requirements for quality-related items;
   e) evidence that engineering or design changes are documented and approved prior to installation;
   f) records of inspections and tests during receiving, storage, and handling;
   g) inspection or test documentation authorizing release of items for installation;
   h) evidence that nonconformances have been satisfactorily resolved or controlled;
   i) verification that the identity of received materials and equipment has been maintained and is in accordance with the latest approved

as-built drawings, equipment lists, specifications, and established procedures. If these checks disclose apparent loss of identification/traceability and cannot be recapped into the affected work control document, the identity shall be reaffirmed prior to release for installation;

j) specific instructions and checklists;

k) approved procedures and instructions for special processes such as wiring and connection methods, coatings, welding, heat treating, and nondestructive examination. This shall include verification that both personnel and procedures/instructions have been qualified through the preparation of workmanship standards, samples, or mock-ups that simulate actual work/job conditions;

l) installation procedures/instruction preparations which have been completed, including such tasks as: removal of packaging; conditioning; cleaning; and preliminary positioning;

m) specific documents defining jigs, fixtures, and equipment for special processes conform to requirements;

n) equipment procedures/instructions for handling, placement, and routing which are in accordance with specified requirements;

o) warning, safety notices/safety plans, and permits which are to be included/posted in the work area;

p) fire watch procedures/instructions and other safety precautions which are to be complied with; and,

q) inspection records verifying that protective measures and physical integrity during storage and handling have been maintained.

2.2 Work/Job Site Conditions

Implementing procedures or inspection instructions shall identify the conditions required for the area to conform with specified requirements and precautions to

prevent conditions which will adversely affect the quality of the item or permanent plant equipment during or following installation. These inspections or checks shall include specific wording to assure that adequate consideration is given of the following, as a minimum:

1) that protection from adjacent activities is being provided, including implementation of approved safety, exclusion, and area cleanliness requirements;
2) that approved consumables/chemicals are included verifying that the control room operators/ safety personnel have issued the proper permit(s) and are aware of transient combustibles in the work area;
3) that protection from inclement weather, environmental, and other ambient conditions adverse to quality is provided;
4) that materials which may be deleterious to the item being installed are controlled;
5) that cable bend radii requirements are identified;
6) that cable softeners are provided where cables enter/exit electrical vias;
7) that installation will not adversely affect the subsequent installation of material/equipment and that repair or rework of any nonconforming items can be performed satisfactorily;
8) that nonconformances for adjacent items have been dispositioned or controlled;
9) that temporary modifications have been installed per approved instructions and are included on the appropriate drawing and controlled/identified, and that the temporary modification will properly interface with the permanent installation;
10) that mating parts such as couplings and flanges are properly positioned and conditioned;
11) that human factor considerations for servicing, maintenance, and calibration activities related to installation have been performed;

12) proper and permanent identification;
13) leveling;
14) clearances and tolerances;
15) tightness of connections and fastenings;
16) fluid levels and pressures;
17) absence of leakage;
18) physical integrity;
19) cleanliness;
20) welding operations, including materials and process controls, adequate purging, and the removal of purge dams on completion;
21) removal of temporary modifications upon completion, as required; and,
22) adequacy of housekeeping, barriers, and protective equipment.

2.3 Installed Systems Inspections and Tests

Implementing procedures and instructions shall identify the checking, inspection, and testing activities required to verify that the completed systems are in compliance with TAPS specified requirements. This is a final verification that the requirements defined by TAPS agreements and commitments, drawings, specifications, and other documents reflected in the Alyeska requirements matrix are reflected in the completed installation. The documents shall also provide for the verification of the inclusion of field modifications and other changes made and controlled during the work activity into the "as-built" document.

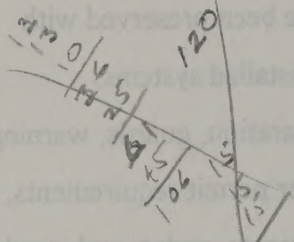
Test procedures shall be prepared for the conduct of tests on completed modifications and maintenance performed on plant structures, systems, and components. Test procedures shall identify prerequisites for testing and shall identify and describe any temporary or simulated condition or equipment.

Checks or inspections shall be defined and performed to verify the operational readiness and completeness of structures, systems, and components. These checks or inspections shall be documented and performed to verify the following as a minimum:

1) equipment and materials have not sustained external physical damage;
2) the installation has been made in accordance with specified criteria and requirements;
3) all nonconforming items have been satisfactorily dispositioned;
4) internal and external restrictions and obstructions to flow and full travel have been removed;
5) supports and restraints are properly configured and installed;
6) interfacing connections with adjacent systems are compatible and free of interference;
7) materials and component identification have been preserved with provisions for traceability throughout the installed systems;
8) safety features such as interlocks, cable separation, guards, warning devices, and lockouts have been installed per permit requirements, are being used, and comply with safety requirements, codes, and regulations;
9) temporary connections such as jumpers and by-pass lines and temporary trip points of control equipment are identified and documented so that their final condition can be verified; and,
10) post-electrical testing is identified, such as continuity, hi-pot, meggar, and pull/tightness verifications of wires.

2.4 Data Analysis and Evaluation

Implementing procedures and instructions shall be established, maintained, and controlled for processing inspection, maintenance and test data and their analysis, evaluation, and final acceptance. These procedures and instructions shall identify individuals or organizations responsible for the acquisition and reduction of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inspection, maintenance, and test data and evaluation against acceptance criteria, operating limits, and performance standards. The data processing procedure shall provide for preliminary evaluation to determine the validity of the inspection, maintenance, and test results, and the appropriateness of continuing the activity. The data shall be analyzed and evaluated: to verify completeness of results, achievement of inspection and test objectives, and operational proficiency of equipment and systems; to identify additional inspection, maintenance, or test results; to identify necessary changes to the installation, inspection, maintenance, or test procedures; and to trend the data results. Inspection, maintenance, and test results supported by the inspection and test data, together with data analysis and evaluation, shall be provided and retained as quality records.

2.5 Quality Records

Record copies of completed quality-related documents shall be prepared. These include, but are not limited to:

1) procedures;
2) instructions;
3) checklists;
4) reports;
5) required qualification/certification records;
6) test equipment records;
7) special process tool calibration records;
8) test or maintenance deviation or exception records; and,
9) inspection, examination, and checklist records.

These completed records shall be placed with other TAPS project records in the document control system files for retrievability and audit/inspection purposes.

Implementing procedures and instructions shall be established, maintained, and controlled for processing inspection, maintenance and test data and their analysis, evaluation, and final acceptance. These procedures and instructions shall identify individuals or organizations responsible for the acquisition and reduction of inspection, maintenance, and test data and evaluation against acceptance criteria, operating limits, and performance standards. The data processing procedure shall provide for preliminary evaluation to determine the validity of the inspection, maintenance, and test results, and the appropriateness of continuing the activity. The data shall be analyzed and evaluated: to verify completeness of results, achievement of inspection and test objectives, and operational proficiency of equipment and systems; to identify additional inspection, maintenance, or test results; to identify necessary changes to the installation, inspection, maintenance, or test procedures; and to trend the data results. Inspection, maintenance, and test results supported by the inspection and test data, together with data analysis and evaluation, shall be provided as quality records.

2.6 Quality Audits and Surveillances

A comprehensive system of planned and documented audits and surveillances shall be carried out by the quality assurance organization to verify compliance with all aspects of the quality assurance program for the development, maintenance, revision, implementation, and document and records control of implementing procedures and instructions.

3. Compliance

The quality assurance organization shall assure that:

1) agreements, codes, standards, and regulations are identified, as well as the responsible organizations to be held accountable for implementing those project commitments;

2) a program exists to match project commitments/regulations to the project implementing policies, procedures, and instructions;
3) a regular management review occurs covering the status and adequacy of implementation through a documented program of self-assessments (development and execution) of QA Manual provisions for which they have designated responsibility;
4) independent corporate management audits/evaluations are performed to assess the overall effectiveness of the implemented QA program; and,
5) quality-related structures, systems, and components are identified, as well as TAPS testing and evaluation activities subject to the provisions of the QA Program and participating organizations having responsibilities relating thereto.

ADDITIONAL ENHANCEMENTS TO QUALITY PROGRAM DESCRIPTION

1. CORRECTIVE ACTION PROGRAM -- EQUIPMENT DESIGN VALIDATION AND QUALIFICATION

Reference: Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), Executive Summary pages 17, 21, 23, 34, 44, 46, 48, 52, 56; I. pages 1-3; III.A. pages and 2 ; III.A.1. pages 1-5; III.F; VII.B. page 1; and XI.A.2 pages 16, 18, 19.

Alyeska shall develop and implement procedures, an organizational plan, and documentation to maintain compliance with regulatory commitments throughout the life of the TAPS.

Alyeska shall develop a systematic and documented validation process for TAPS quality-related structures, systems, and components requiring environmental and/or seismic qualification. The qualification program shall include the identification of all equipment requiring environmental and/or seismic qualification from a master equipment

list and a "Q-list." The regulatory requirements, commitments, codes, and standards which form the engineering design basis for equipment requiring such qualification shall be defined and extracted from a "Regulatory Requirements Matrix" which shall be maintained by Alyeska.

Alyeska shall:

1) develop an equipment qualification master list (EQML). The EQML shall include or reference the following:
   - a) procurement specification;
   - b) system identification;
   - c) component type;
   - d) component description;
   - e) location; and,
   - f) manufacturer/model number.

2) establish a consistent set of TAPS equipment design criteria which encompasses the EQML and which complies with the TAPS regulatory commitments;

3) produce a set of design control procedures which assures compliance with the equipment qualification design criteria;

4) evaluate structures, systems, and components and develop engineering dispositions and direct the required corrective actions determined by the Corrective Action Program (CAP) investigations to demonstrate that structures, systems, and components are in conformance with the equipment qualification design criteria;

5) identify the data to be considered during the engineering technical disposition process. Such data used in this disposition process shall include, as a minimum:
   - a) historical documents (e.g., specifications, procedures, drawings, and inspection results);
   - b) external issues;
   - c) construction practices;
   - d) quality records;
   - e) test results;

f) audit reports;
g) state code inspection records;
h) surveillance reports;
i) NCR's, DR's, PROF's, work orders, and CAR's;
j) inspections conducted to date;
k) results of third-party reviews;
l) procurement documents;
m) daily reports;
n) construction packages;
o) maintenance reports; and,
p) hardware receipt inspections.

6) validate that the environmental and/or seismic qualification of equipment is in conformance with the regulatory commitments and that the installed hardware is in conformance with the validated design;

7) produce a set of consistent and validated equipment qualification documentation including the engineering methodologies and design criteria incorporated into equipment qualification specifications, drawings, design control procedures, inspection validation implementing procedures, and the identification of required design changes;

8) incorporate the equipment qualification documentation into the TAPS configuration management system to facilitate maintenance and operation of the TAPS, thereby assuring consistent and lasting compliance with regulatory requirements. These controls shall provide for the ability of the equipment to perform its quality-related functions to assure that the health and safety of the public, the environment and the ecosystem will not be adversely affected by the environmental and/or seismic conditions to which the TAPS may be subjected; and,

9) perform technical and programmatic audits and surveillances to provide additional assurance that the design criteria are technically correct and embody the equipment

qualification regulatory commitments, and that those commitments have been carried out during performance of the CAP.

2. CONTROL OF CONSUMABLES

Reference: Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), Executive Summary pages 32 and 39.

Alyeska shall develop, document, and implement a quality assurance program relating to the control of consumables, chemicals, and combustibles, including transient consumables, chemicals, and combustibles. This program shall be in accordance with the quality assurance/quality control provisions of this section.

2.1 Methodology

Alyeska shall identify and maintain a list of approved consumables in a database to provide the user (e.g., operations, maintenance, quality assurance, safety departments) a listing of approved consumables/chemicals which shall only be used to support TAPS quality-related structures, systems, and components activities. Alyeska engineering criteria for the design application and use of consumables/chemicals shall be determined from sources such as: vendor specifications, vendor manuals, construction specifications, ASTM standards, design specification, technical bulletins, and contact with vendors and architect/engineer firms.

The consumables list shall delineate for each item of use the acceptable controls necessary to preclude degradation of quality-related equipment. A consumable chemical may be added to the list without further evaluation if its determined use precludes its entry into the TAPS quality-related structures, systems, or components.

2.2 Consumables Database

The consumables database shall include, as a minimum:

1) item of material by name;
2) item category by use code;
3) references (including specifications, procedures, communications, vendor instructions);
4) requirements or restrictions for use or non-use (to include labeling requirements);
5) procurement documentation requirements (may reference notes included in text of consumables-control listing); and
6) material description (i.e., reagent grade) and chemical formula, if available.

2.3 Consumables -- Sort by Use

The Consumables listing shall be sorted by USES and categorized, as a minimum, into one of the following "USE" codes:

1) abrasive;
2) adhesive;
3) biocide;
4) caulking;
5) cleaning;
6) desiccant;
7) electrical;
8) lubricant;
9) preservative coatings;
10) tape;
11) wrapping material;
12) chemicals;
13) inspection; and,
14) other.

2.4 Document Control

The engineering Consumables list shall be a controlled document, issued and controlled by document control to each identified user organization.

2.5 Monitoring

Quality assurance shall audit and perform surveillances to verify, and quality control inspectors and safety personnel shall verify, that the only consumables/ chemicals in use are approved as listed on the Consumables Controlled Lists and that approved transient consumables/chemicals/combustibles are controlled, properly stored for temporary use, do not exceed maximum allowable stored quantities, and are properly inventoried/posted in the work area. It shall also be verified that the type, quantity, and use of the transient commodities have been approved by safety and fire response personnel and that the controlling permits are on file in their respective work areas.

2.6 Transient Consumables, Chemicals, and Combustibles

Alyeska shall develop, document, maintain, and implement a transient consumables, chemicals, and combustibles control program to allow temporary storage and use of such commodities during approved work activities. The locations requiring special safety and work control considerations for transient consumables, chemicals, and combustibles are those buildings, areas, or rooms in which such commodities are not normally present or are not approved storage/use areas.

The documented control program shall provide for the approved transport, storage, use, and tracking of such temporary commodities during the intended period of time involving the work activity at the location specified. The approval for the transport, storage, and use of such commodities shall include safety and fire response personnel and control room operations personnel. The approval and

tracking document shall include, as a minimum, the type of consumables/ combustibles involved, the allowed quantity of the materials to be used/stored, special handling and storage considerations, the time period involving storage and use, special safety and fire prevention requirements, updated inventory control and posting, and the tracking mechanism for the removal of such commodities from the work location and close-out of the transient permit.

The safety and fire response personnel shall take into account the types and quantities of such transient commodities and determine if the access points to such work locations require fire rating placards to be posted and visible.

3. LESSONS LEARNED

Reference: Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), XI.D.1, pages 1-4.

Alyeska shall develop, maintain, and implement a comprehensive and documented quality assurance program encompassing TAPS project lessons learned. The scope of the program shall include, as a minimum, personnel errors or procedural problems which affect performance of quality-related structures, systems, or components during operation, maintenance, safety, calibration, modification, testing, or inspections.

Provisions shall be included for the inclusion of root cause analyses techniques for significant conditions adverse to quality when developing lessons learned as part of cause and corrective action determinations.

The program shall also require:

1) lessons learned to be maintained in a master lessons learned computerized database logging system for ready retrievability by TAPS personnel;

2) lessons learned to be tracked and incorporated into the appropriate user's documents, e.g., drawings, procedures, or instructions;
3) lessons learned to be incorporated into the TAPS training program for the responsible operator, maintenance, technician, and inspection personnel training; and,
4) that the development, maintenance, implementation, and follow-up of the lessons learned program be included in the Alyeska quality assurance audit and surveillance program.

4. MAINTENANCE

Reference: Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), Executive Summary pages 38 and 52; III.F. pages 1 and 2; XI.A.1. pages 1-36; XI.B.3., pages 1-2.

Alyeska shall develop, document, and implement procedures relating to maintenance activities for quality-related structures, systems, and components which is in conformance with regulatory requirements and commitments, vendor manuals, technical bulletins, and industry guides or standards.

The documented maintenance program shall include, as a minimum, the following essential elements:

1) preventive maintenance;
2) corrective maintenance;
3) predictive maintenance;
4) equipment control;
5) special processes;
6) cleanliness controls;
7) housekeeping controls; and,
8) a motor operated valve maintenance program.

4.1 Preventive Maintenance (PM)

The documented preventive maintenance program shall include, as a minimum:

1) responsibility for the program;
2) administrative controls, criteria, and responsibilities for review, approval, and accomplishment of maintenance requests, as follows:
    a) approval of maintenance requests;
    b) identification of the personnel who performed the maintenance task;
    c) identification of the personnel who inspected the maintenance work;
    d) cause of the malfunction or failure which necessitated the maintenance work;
    e) description of the corrective action taken;
    f) identification of the post-maintenance functional testing performed;
    g) identification of personnel who performed the post-maintenance testing; and,
    h) identification of replacement parts or materials used;
3) a master equipment list (MEL) including all quality-related items (Q-list);
4) provisions to assure that all quality-related items requiring PM activities are included on a master PM schedule;
5) a listing of open/overdue PM activities;
6) provisions for establishing PM frequencies;
7) provisions for maintaining the latest vendor manuals for quality-related items, including a controlled distribution system for procurement to forward the latest vendor documentation as it is received from the vendor, to the appropriate maintenance planners for incorporation into the PM instructions/work orders;
8) provisions to route PM instructions/work orders through the quality assurance and safety organizations for incorporation of quality and safety requirements and hold or witness points;

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9) methods, criteria, and responsibilities describing the work activity and for performing inspection and acceptance of maintenance activities;
10) methods and responsibilities for performing functional testing following maintenance work and/or prior to their being returned to service;
11) identification of test and measuring equipment used;
12) provisions to review the qualification records of the maintenance, inspection, and testing personnel to verify that personnel qualification meets the requirements of the work performed; and
13) provisions for accumulating operating times/cycles, as-found condition, needed adjustments, repairs, etc., items removed and replaced, and the cause of the needed repairs. The data accumulated shall be factored into the quality assurance trending program for mean-time-to-failure analysis in developing a predictive maintenance program.

4.2 Corrective Maintenance (CM)

The documented corrective maintenance program shall include, as a minimum:

1) responsibility for the program;
2) provisions for initiating requests for routine and emergency maintenance;
3) methods, criteria, and responsibilities describing the work activity and for performing inspection and acceptance of maintenance activities;
4) methods and responsibilities for performing functional testing following maintenance work and/or prior to their being returned to service;
5) administrative controls, criteria, and responsibilities for review, approval, and accomplishment of maintenance requests, as follows:
    a) approval of maintenance requests;
    b) identification of the personnel who performed the maintenance task;
    c) identification of the personnel who inspected the maintenance work;

   - d) when a malfunction or failure is encountered during the PM, the cause of the malfunction or failure;
   - e) description of the corrective action taken;
   - f) identification of the post-maintenance functional testing performed;
   - g) identification of personnel who performed the post-maintenance testing; and,
   - h) identification of any replacement parts or materials used;

6) a listing of maintenance work to be accomplished, including date opened and required completion date;

7) provisions to route quality-related CM instructions/work orders through the quality assurance and safety organizations for incorporation of quality and safety requirements and hold or witness points; and,

8) provisions for reviewing completed corrective maintenance records to assess the adequacy of the preventive maintenance program, to identify repetitive failures, and to identify process, program, and design deficiencies. The data accumulated shall be factored into the quality assurance trending program for mean-time-to-failure analysis in developing a predictive maintenance program.

4.3 Predictive Maintenance

The documented predictive maintenance program shall include, as a minimum:

1) responsibility for the program;

2) provisions to receive, process, and analyze field data compiled from maintenance and deficiency reports dealing with preventive and corrective maintenance and rework activities on quality-related items to determine predictive maintenance requirements to prevent failures or improve serviceability;

3) provisions to interface with engineering, maintenance, operations, quality assurance trending personnel, engineering, procurement and

vendors/manufacturers in the accomplishment of developing and maintaining an approved comprehensive predictive maintenance program.

4) provisions to incorporate the processed data achieved from the data accumulated and analyzed into the maintenance program schedule to perform activities of a preventive nature, thereby improving TAPS reliability, effectiveness, and efficiency.

4.4 Equipment Control

The documented TAPS maintenance program shall include measures for equipment control during performance of all maintenance activities. These provisions shall include, as a minimum:

1) approval to release equipment or systems for maintenance granted by the operating and safety organizations;
2) clear tagging/identification of the status of equipment and systems;
3) procedures and responsibilities to determine and verify activities to assure that necessary prerequisite, in-process, and final restoration measures such as environmental, electrical, fire prevention, and personnel safety activities have been established and have been correctly and completely implemented; and,
4) that procedures and responsibility for returning equipment to service have been established and have been correctly and completely implemented.

4.5 Special Processes

The documented TAPS maintenance program shall include measures for the control of special processes during performance of all maintenance activities. These measures shall include, as a minimum:

1) provisions that only qualified procedures shall be used;
2) provisions that only qualified and/or certified personnel shall be used;
3) provisions that only qualified tools and equipment shall be used;

4) provisions for the maintenance and accessibility of a current file of special processes which includes qualification records of personnel and procedures;
5) provisions and criteria to establish when the use of mock-ups or other special training will be required; and
6) the verification by qualified and certified quality control inspection personnel that all special process requirements during maintenance activities have been met.

4.6 Cleanliness Controls

The documented TAPS maintenance program shall include measures for maintaining cleanliness controls during performance of all maintenance activities. These measures shall include, as a minimum:

1) procedures for cleaning quality-related systems and components;
2) procedures for maintaining the cleanliness of previously cleaned systems and components;
3) procedures for establishment of cleanliness classifications for TAPS areas requiring special attention; and
4) the verification by quality control and safety personnel that cleanliness levels are maintained during maintenance activities involving hold/witness points or special safety considerations.

4.7 Housekeeping Controls

The documented TAPS maintenance program shall include measures for maintaining building and area housekeeping controls during performance of all maintenance activities to assure a clean and safe work area and environment.

]4.8 Motor Operated Valve Maintenance Program

The documented TAPS maintenance program for motor operated quality-related valves shall include, as a minimum:

1) the torque value required to open and close the valve with the verification that the torque switches supplied cannot demand a larger torque than the motor can supply;
2) type of torque switch and settings for open and close direction;
3) motor size, voltage, and full load and locked rotor amps with the verification that the valve operator motors are not under or marginally sized for their particular load;
4) overload relay and heater size;
5) breaker size and breaker trip setting with the verification that the breakers are not under or marginally sized. The magnetic trip settings, if applicable, shall be based on motor maximum torque output, the thermal overload relays and heaters, and shall have been sized for the TAPS applied locked rotor tripping time (e.g., breaker trip within 5 to 10 seconds or 1 to 2 minutes);
6) identification of whether magnetic trip is automatic or requires manual reset at the breaker; and,
7) identification of valves which have operators with non-locking gears or break assemblies.

4.9 Monitoring

Alyeska quality assurance shall perform audits and surveillances at the various TAPS locations where maintenance activities are being performed in order to verify compliance with these minimum requirements. Additionally, safety and fire protection and environmental monitoring personnel shall perform periodic surveillances to verify compliance with safety and environmental requirements during maintenance activities.

5. FIRE AND SAFETY CONTROL

Reference: Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), Executive Summary page 30.

Alyeska shall develop, document, maintain, and implement, as part of the quality assurance program, a fire and safety control, inspection, and maintenance program at all TAPS locations.

All quality-related structures, systems, components, and equipment included in the fire and safety prevention and response program shall be included in documented procedures, instructions, and checklists to inspect, maintain, and test said structures, systems, components, and equipment.

The inspection program shall be integrated into the Alyeska Preventive Maintenance program and shall be conducted by qualified fire and safety personnel utilizing approved procedures, instructions, and checklists containing acceptance criteria extracted from regulatory fire and safety codes and standards.

Conditions identified during fire and safety inspections which do not conform to regulatory requirements and commitments shall be documented as part of the corrective maintenance program work order system.

Quality assurance shall perform audits and surveillances to verify the implementation of a documented, controlled, and effective TAPS fire and safety control program which meets safety and quality assurance requirements.

6. IN-SERVICE INSPECTION AND TESTING PROGRAM

Reference: Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), Executive Summary pages 23, 34, and 44; and I.1-3.

As part of Alyeska's engineering design validation program to assure that the TAPS quality-related structures, systems, and components meet regulatory commitments, codes, and standards, including seismic, environmental and as-built conditions, Alyeska shall review, develop, document, schedule, maintain and implement a quality assurance In-service Inspection and Testing (ISI&T) program for quality-related items including, as a minimum:

1) mainline pipe girth welds;
2) non-mainline pipe supports;
3) mechanical connections to pressure-retaining components and building structure;
4) weld connections to building structure;
5) pumps; and,
6) valves.

6.1 Responsibility

Quality control inspection personnel performing the ISI&T general visual mechanical and welding inspections and nondestructive testing shall be, as a minimum, level II inspectors under Alyeska's inspector qualification and certification program. Inspection and testing results shall be documented, maintained and stored as lifetime quality records. Inspection and testing results which are determined to be nonconforming shall be documented on nonconformance reports in accordance with Alyeska's quality assurance program for the control of nonconforming items.

6.2 Hardware ISI&T Verifications

1. Mainline Pipe Girth Welds

   Alyeska shall develop and implement a statistically based quality assurance sampling program involving in-service nondestructive testing of mainline pipe girth welds to establish and maintain the safety margin of the TAPS girth welds installed and accepted during the original pipeline construction and inspection activities. The nondestructive testing methods employed and results obtained shall be compared against original construction installation and inspection acceptance criteria and records to verify continued compliance of the girth weld configuration to meet minimum engineering and quality acceptance standards.

2. Non-Mainline Pipe Supports

   The non-mainline pipe supports shall be visually inspected to verify, as a minimum:

   1) general configuration/support type, location, and function are in compliance with the latest design-verified as-built drawing;
   2) clearances;
   3) final surfaces of support welds, the heat-affected zone for 1/2" on each side, and base material are:
      a) the correct size;
      b) free of course ripples, grooves, overlaps, etc.;
      c) free of cracks;
      d) free of incomplete fusion;
      e) of a correct weld profile;
      f) free of weld overlap;
      g) free of surface porosity;
      h) not underfilled or undercut; and,
      i) free of corrosion, rust, erosion, and physical damage.

3. Mechanical Connections to Pressure-Retaining Components and Building Structure

   Mechanical connections to pressure-retaining components and building structures shall be visually inspected to verify that, as a minimum:

   1) installations are located in accordance with, and meet, the latest design-verified as-built drawings;
   2) installations are free of cracks, corrosion, erosion, or physical damage;
   3) support plates have no gaps more than 1/16" between the plate surface and concrete;
   4) fasteners are not damaged, are free of extraneous materials, locking devices are provided, torque values are obtained or are snug tight;
   5) cotter pins are installed, tangs are spread and are of the correct size; and,
   6) threaded hardware has minimum thread engagement.

4. Weld Connections to Building Structures

   Weld connections to building structures shall be visually inspected to verify that they are, as a minimum:

   1) the correct size;
   2) free of course ripples, grooves, overlaps, etc.;
   3) free of cracks;
   4) free of incomplete fusion;
   5) correct weld profile;
   6) free of surface porosity;
   7) not underfilled or undercut; and,
   8) free of rust, corrosion, erosion, and physical damage.

5. Pumps

1) Alyeska shall select pumps for testing that are:
    - a) required by the ASME code by classes of the code;
    - b) provided with an emergency power supply; or
    - c) intended to perform a specific function in safely shutting down a quality-related sub-system or system to mitigate the consequences of an accident.

2) Alyeska shall develop, document, maintain, and implement the pump test program for pumps which required in-service inspection (ISI) testing which includes, as a minimum:
    - a) pump number as listed on the Flow Diagram;
    - b) pump name;
    - c) code class;
    - d) Flow Diagram and coordinates number of the Flow Diagram and coordinates for the pump location on the Flow Diagram;
    - e) test parameters, including:
        - i) speed
        - ii) inlet pressure
        - iii) differential pressure
        - iv) flow rate
        - v) vibration velocity
        - vi) bearing temperature
        - vii) lube level or pressure

3) Pumps which are in operation need not be secured to measure the idle suction pressure. Recording the operating pump suction provides an adequate indication of hydraulic parameters at the pump inlet and reduces the potential impact to TAPS operations.

6. Valves

1) Alyeska shall select valves for testing which are:
   - a) required by the ASME code by classes of the code;
   - b) intended to perform a specific function in safely shutting down a quality-related sub-system or system to mitigate the consequences of an accident; or,
   - c) required for safety overpressure protection.

2) Alyeska shall develop, document, maintain, and implement the valve test program for valves which require ISI testing which includes, as a minimum:
   - a) system name designated on Flow Diagram in which the associated valve functions;
   - b) Flow Diagram sheet number on which the valve is located;
   - c) valve number as listed on the Flow Diagram;
   - d) code class;
   - e) coordinates-location of valve on the Flow Diagram;
   - f) passive - an "x" used to indicate valves which are not required to move from their normal position to accomplish their safety function;
   - g) size and valve type;
   - h) actuator type;
   - i) normal position and safety function position;
   - j) stroke times, and trending;
   - k) leak testing;
   - l) fail-safe testing; and,
   - m) position indicator verification.

6.3 Monitoring

Quality assurance shall perform surveillances and audits to verify all aspects of the quality assurance program for In-Service Inspection and Testing of quality-related structures, systems, and components.

7. GAS EMISSIONS AND MONITORING

Reference: Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), Executive Summary, pages 33, 53, 56, and 57; IV.D., pages 1 and 2; IV.C., page 1; VIII.A.1.; and VIII.B., pages 1-2.

7.1 Emission Monitoring Program

Alyeska shall develop a hazardous gas emission quality assurance monitoring program capable of monitoring emissions of hydrogen sulfide, nitrous oxide, and benzene, and providing an alert should the concentration of the emissions approach noxious levels. As a minimum, the program shall be designed so as to assure the health and safety of the public and the environment/ecosystem.

1) gas monitors and alarms are installed in and around all areas where the potential for hazardous gas emission exists;
2) monitors are distributed at a density sufficient to detect emissions that approach noxious levels;
3) equipment is included for measuring the volume of hazardous emissions from facilities, including surge tanks and tankers as a minimum, which are capable of venting hazardous emissions to the atmosphere;
4) emissions through flare stacks are measured utilizing a combination of modeling and equipment; and,
5) the program is procedurally defined and controlled.

7.2 Program Verification

A comprehensive system of planned and documented audits and surveillances shall be carried out by quality assurance to verify that the emission monitoring program is implemented in accordance with the criteria specified in 1. above, including any additional requirements specified in the implementing procedures.

8. Pipeline/Vertical Support Member (VSM) Contact Points

Reference: Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), Executive Summary pages 17, 21, and 46; III.A. pages 1-5.

8.1 Model Development

Alyeska shall conduct a hazard analysis of the aboveground portion of the pipeline. The hazard analysis shall include detailed modeling of the pipeline. Model development shall include both physical models and three dimensional (3D) computer models of the standard aboveground configurations of the pipeline, including the most current existing worst-case configuration. The physical models shall be used to verify the various input criteria and output data of the computer models. Physical models shall be analyzed on "shaker tables." Once the validity of the computer models is verified, the computer models shall be modified to reflect the various locations along the right-of-way where the contact points exist. These computer models shall then be analyzed to determine the stresses developed and possible failure modes during the operating and contingency earthquake events which are unique to each location.

Three-dimensional computer models of the standard aboveground configurations of the pipeline shall be developed using design graphics tools such as MicasPlus for pre-processing and ANSYS, DYNA 3D, or NIKE 3D for post-processing.

The model development and analytical work may be conducted by personnel who were involved in the original design, but shall be verified by an independent third party. The analysis shall include the following, as a minimum:

1) Develop 3D computer models of the standard configurations of the aboveground pipeline which can be modified to reflect the current configuration of the pipeline.
2) Impose earthquake loadings on the computer models. Relevant analytical input criteria selected shall be either those used in the original design analysis and found in *Summary Report, Basis for Earthquake Design For The Trans Alaska Pipeline System*, Appendix A-3,1051A, Alyeska Pipeline Service Company, or those found in current applicable design codes and standards, whichever are the more conservative.
3) Develop physical models of the standard aboveground configurations of the pipeline.
4) Impose earthquake loadings on the physical models with shaker tables. Relevant analytical input criteria selected shall be either those used in the original design analysis and found in *Summary Report, Basis for Earthquake Design For The Trans Alaska Pipeline System*, Appendix A-3,1051A, Alyeska Pipeline Service Company, or those found in current applicable design codes and standards, whichever are the more conservative.
5) Compare the output data from the physical and computer models. Necessary adjustments shall be made so that the validity of the computer output data can be verified by the results of the shaker table testing.
6) Once the validity of the computer model is verified, initial analytical emphasis shall be devoted to modeling those portions of the pipeline which are currently not aligned within the design parameters.

8.2 Analysis

The models shall be studied to determine:

1) The range of motion of the pipeline during the operating and contingency seismic events.
2) The stresses developed in the pipeline from pipeline/VSM contact during the design and contingency earthquake events. Areas of particular interest include those locations which produce high localized stress concentrations in the line such as saddles and other discontinuities.
3) Stresses developed in the pipeline from movement during the operating and contingency seismic event. Areas of particular interest include those locations which produce localized stress concentrations in the line such as saddles, valves, anchors, and others.
4) Stresses developed in the VSM structure resulting from the operating and contingency seismic events.
5) Failure modes.

If the foregoing analysis indicates that the stress developed in the pipeline exceeds the allowable stresses as specified in *Alyeska Pipeline Service Company Section 1.4-Design Criteria,* Paragraph 1.4.2.2., Pipe Stresses, Table 1.4.2.2-1, Allowable Stresses (computed elastically) for Aboveground Pipeline, or if the analysis indicates that the allowable stresses developed in the pipeline exceed applicable standards or codes, the situation shall be rectified in the most expeditious manner possible. Mitigation options potentially include the following:

1) Installation of bents wide enough to prevent pipeline/VSM contact during operating and contingency seismic events.
2) Cutting and realigning the pipe so that the pipeline will not contact the VSM during the operating and contingency seismic events.

3) Reduction of high localized stresses to within the allowable limits by installation of bumpers and bumper saddles or other appropriate cushioning devices at the problem VSM.

If the foregoing analysis indicates that the loads imposed on the VSM supporting structures exceed the design loadings as shown in *Alyeska Pipeline Service Company Summary Report, Aboveground Pipeline Support System for the Trans Alaska Pipeline,* Appendix A-3.1014, paragraph 6.1 Intermediate Support Loads, Table 6.5 Design Loads for Intermediate Supports, or if the analysis indicates that the induced loads exceed any applicable code or standard, or if the analysis indicates that more than two (2) adjacent VSM will fail, the conditions shall be rectified in the most expeditious manner possible. Mitigation options are similar to those previously listed.

9. QUALITY-RELATED EMPLOYEE CONCERNS

Reference: Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), XIII.C. pages 1-15.

9.1 Quality-Related Employee Concerns and Concerns from Others

The Alyeska quality assurance organization shall develop and implement a process for investigating and resolving quality-related concerns received from the Alyeska ombudsman program or any other individuals or groups. This process shall, as a minimum, assure and provide for:

1) evaluation and categorization of quality-related concerns based on criticality and type;
2) incorporation of quality-related concerns into the quality assurance program for corrective action, trend analysis, or nonconformance reporting;
3) confidentiality;

4) an investigation program staffed with trained investigators knowledgeable in Alyeska activities and confidential investigative techniques, such as those in the plant analysis group;

5) investigation and resolution of expressed concerns including documented approval or disapproval of the resolution and the investigation process by the individual expressing the concern;

6) incorporation of quality-related resolutions into the quality assurance program for corrective action, trend analysis, or nonconformance reporting; and,

7) review of the ombudsman program through audits and surveillances designed to assure the effectivity of that program, particularly the identification of quality-related concerns and their prompt distribution to the quality assurance organization for investigation and resolution.

This new process for handling quality-related concerns shall be publicized by Alyeska in a manner sufficient to demonstrate management's sincere interest in acquiring and resolving dissenting opinions and concerns. In order to assure participation and demonstrate management's sincerity, adequate staffing shall be provided to maintain verbal contact with concerned individuals on at least a weekly basis, and complete all but the most complex investigations within thirty (30) days of receipt.

9.2 Program Verification

A comprehensive system of planned and documented audits and surveillances shall be carried out by quality assurance to verify that allegations by employees and other concerned individuals or groups are properly investigated and resolved, and that any deficiencies identified in such investigations regarding quality-related issues or potentially quality-related issues are properly documented and resolved.

QA-36, Section 3, Process and Industrial Safety

Reference: Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), Section XI.A.5, Process and Industrial Safety, pages 1-3.

The quality assurance program shall provide controlled measures to verify and assure that process and industrial safety activities and functions which are quality-related, as a minimum:

1) are performed in accordance with controlled procedures;
2) are surveilled and audited;
3) have and implement adequate provisions for identifying deficiencies, determining cause and corrective action;
4) forward deficiency documentation to the Plant Analysis group for inclusion in the trending and corrective action program; and,
5) have sufficient staff in number and qualification to implement the program(s).

1. Process Safety Management

The quality assurance organization shall develop controlled measures to verify and assure that the quality-related functions and activities assumed by the Process Safety Management program, currently in development, as a minimum:

1) are performed in accordance with controlled procedures;
2) are surveilled and audited;
3) have and implement adequate provisions for identifying deficiencies, determining cause, and corrective action;
4) forward deficiency documentation to the Plant Analysis group for inclusion in the trending and corrective action program;
5) have sufficient staff in number and qualification to implement the program; and,
6) utilize process hazard analysis methodologies in the Plant Analysis Group, including hazard and operability studies, failure mode and effect analysis, and fault tree analysis as defined in OSHA 29 CFR Part 1910.

2.0 Structural and Mechanical Systems

Alyeska shall institute a program which will result in a systematic approach to process hazards management which, when implemented, will ensure that the means for preventing a catastrophic release, fire, or explosion are understood, and that the necessary preventive measures and lines of defense are installed and maintained. The program shall include provisions for the following, as a minimum.

1) process safety information;
2) process hazard analysis;
3) operating procedures;
4) training;
5) mechanical integrity; and,
6) incident investigations.

2.1 Process Safety Information

Process safety information shall include the development and maintenance of information pertaining to the technology of the various processes involved in the TAPS. As a minimum, this shall include the following when it can be applied:

1) block flow diagrams or simplified process flow diagrams;
2) safe upper and lower limits for such factors as loadings, temperatures, pressures, flows and the consequences of any deviations in the process, and where this information is not available it shall be derived from a Process Hazard Analysis;
3) verification that all equipment is appropriate for the operation, that its integrity is maintained, and that it meets appropriate standards and codes or recognized and documented engineering practices;
4) information compiled concerning structural items and equipment used in TAPS shall describe the materials of construction, piping and instrument diagrams (P&ID's), electrical classification, relief system design, design

codes employed, and safety systems such as interlocks, detection, monitoring and suppression systems; and

5) determination and documentation that existing equipment which was designed in accordance with codes, standards, or practices which are no longer in general use, is designed, installed, maintained, inspected, tested, and operated in such a manner that safe operation is assured.

This can be accomplished by documenting prior successful operating procedures; documenting that the equipment is in accordance with the latest edition of codes and standards; or, performing an engineering analysis to determine that the equipment is appropriate for its intended use.

2.2 Process Hazard Analysis

Process hazard analysis is a thorough, orderly, systematic approach for identifying, evaluating, and controlling processes. The hazard analysis focuses on equipment, human actions, and external factors which might impact the process. Properly developed, the analysis will reveal potential failure points or failure modes, thereby allowing management to take corrective action to improve the safety of the process and preplan actions which would be necessary to mitigate damage. The analysis must be conducted by competent persons, knowledgeable in engineering and process operations and familiar with the process being evaluated. If an outside consultant is utilized to conduct the analysis, the consultant shall include on his/her work team at least one Alyeska employee who is familiar with the process under study. Alyeska shall conduct one or more of the following analyses as applicable to particular processes involved in TAPS:

1) Hazard and Operability Study (HAZOP);
2) Failure Mode and Effect Analysis (FMEA); and,
3) Fault Tree Analysis.

The process hazards analysis must address the following, as a minimum:

1) hazards of process;
2) engineering and administrative controls; and,
3) consequence analysis of the effects of a component failure on employees, the public, and the environment/ecosystem.

Alyeska shall establish a system to address the findings and recommendations of the analysis teams, to document actions taken and inform employees who are affected by the recommendations or actions. Recommendations are to be implemented in a timely manner.

2.3 Operating Procedures

Operating procedures which describe the tasks which are directly and indirectly related to operation of the TAPS shall be developed which are appropriate, clear, consistent, and communicated to the employees. The procedures shall address the operating limits, consequence of deviation, steps required to correct and/or avoid deviation, and safety systems and their functions. These procedures shall be written and include, as a minimum:

1) startup after shutdowns;
2) handling special hazards;
3) monitoring and surveillance;
4) emergency and normal shutdown;
5) normal operations; and,
6) temporary operations.

2.4 Training

The quality assurance organization shall assure that the training program provides instruction for personnel involved with specific processes to understand the nature

and causes of problems arising from operation of the TAPS. The training program shall include, as a minimum:

1) training in an overview of the process and in the procedures related to his/her task in the process for each employee presently involved and each employee before being newly assigned in operating, maintaining, monitoring, or involvement with surveillance activities of specific processes;
2) provisions for refresher training on a three-year basis and supplemental training as required; and,
3) adequate records to certify that employees have received and successfully completed the required training.

2.5 Mechanical Integrity

Mechanical integrity applies to storage tanks, vessels, piping systems including valves and supports, relief and vent systems, emergency shutdown systems, controls including monitoring devices and sensors, alarms and interlocks, and pumps. Alyeska shall, as a minimum:

1) establish and implement written procedures to maintain the ongoing integrity of the process equipment;
2) establish and implement written procedures for the inspection and/or testing of all mechanical equipment;
3) assure that inspection and testing procedures follow recognized and generally accepted engineering practices;
4) assure that frequency of testing and inspection is dictated by manufacturer recommendations, good engineering practices, and prior operating experiences;
5) document each inspection and/or test performed on mechanical equipment so that the documentation identifies the date of the inspection or test, the name of the person who conducted the inspection and/or test, some

identifying number which will identify the piece of equipment on which the inspection and/or test was performed, a description of the inspection and/or test, and the results of the inspection and/or test;

6) assure that deficiencies in the mechanical equipment which are outside the acceptable limits shall be corrected before further use of the equipment in a safe and timely manner after necessary steps are taken to assure safe operation;

7) assure that with the addition of new equipment, such equipment is compatible with the permanent plant equipment which is in place, and that it is suitable for the process application for which it will be used;

8) perform appropriate checks and inspections to assure that existing quality-related (e.g., safety-significant) equipment and all new quality-related equipment is installed properly and is consistent with the design specifications and the manufacturers' instructions; and,

9) assure that all maintenance materials, spare parts, and equipment are suitable for the application for which they will be used.

2.6 Incident Investigations

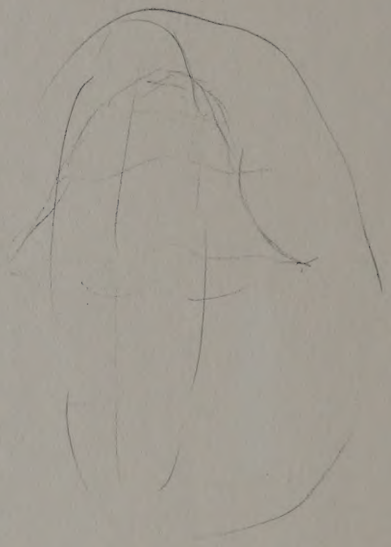
Incident investigations shall be conducted by Alyeska for each incident which resulted in, or could reasonably have resulted in, a catastrophic release of crude oil. The incident investigation plan shall provide for, as a minimum:

1) timely initiation of incident investigations as promptly as possible but not later than 48 hours following the incident;

2) establishment of an incident investigation team consisting of at least one person knowledgeable in the process involved and including a contractor employee if the incident involved the work of a contractor, and other persons with appropriate knowledge and experience to thoroughly investigate and analyze the incident; and,

3) preparation of an incident report at the conclusion of the investigation, including, as a minimum:
    1) the date of the incident;
    2) date the investigation began;
    3) a description of the incident;
    4) the factors which contributed to the incident; and,
    5) any recommendations resulting from the investigation.

Alyeska shall establish and implement a program to promptly address and resolve the incident report findings and recommendations. Resolutions and corrective actions shall be documented. The incident report shall be reviewed by all personnel whose job tasks are relevant to the incident findings, including contract employees where applicable.



QA-36, Section 4, Environment and Contingencies

Reference: Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), Executive Summary, page 45; Section XI.A.5, Process and Industrial Safety, pages 1-3.

The quality assurance program shall provide controlled measures to verify and assure that environmental activities and functions which are quality-related, as a minimum:

1) are performed in accordance with controlled procedures;
2) are surveilled and audited;
3) have and implement adequate provisions for identifying deficiencies, determining cause, and corrective action;
4) forward deficiency documentation to the Plant Analysis group for inclusion in the trending and corrective action program; and,
5) have sufficient staff in number and qualification to implement the program(s).

QA-36, Section 5, Operations

Reference: Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), XI.B.9. page 1.

The quality assurance program shall provide controlled measures to verify and assure that operations activities and functions which are quality-related, as a minimum:

1) are performed in accordance with controlled procedures;
2) are surveilled and audited;
3) have and implement adequate provisions for identifying deficiencies, determining cause, and corrective action;
4) forward deficiency documentation to the Plant Analysis group for inclusion in the trending and correction action program; and
5) have sufficient staff in number and qualification to implement the program(s).

QA-36, Section 6, Projects

Reference: Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), Executive Summary, page 40, Work Control; and Section XI.B.11, pages 1-2, Projects.

The Alyeska Projects operation shall develop, document, maintain, and implement departmental procedures encompassing work control to assure that maintenance, development, and operational modifications, including but not limited to new installations, are performed in accordance with regulatory and design control requirements. Work control also shall assure that design or program deficiencies are identified, documented, and incorporated into the Alyeska quality assurance program for nonconforming materials and control to assure acceptable resolution including corrective action measures to preclude recurrence.

The quality assurance organization shall assure that controlled measures are developed and implemented to audit and surveil the work control program which has been implemented. These measures shall assure that the requirements and intents set forth in this section have been adequately and accurately translated into implementing procedures and that the implementing procedures are being properly implemented. They shall further assure that any revisions to the implementing procedures continue to meet the requirements and intent set forth in this section.

The work control program shall include provisions to assure that, as a minimum:

1) as-built conditions and configurations are verified and defined in a controlled manner prior to design analysis being performed for the work and again once the work is complete;
2) the as-built configurations of all quality-related structures, systems, and components shall have been identified, verified, and defined; any changes which are necessary to achieve the desired engineering definition have been properly accomplished utilizing appropriate design or design change documents; and the results of such identification, verification, and definition have been properly translated into as-built drawings and specifications;

3) the current engineering definition of all quality-related structures, systems, and components are in conformance with their respective design output documents;
4) the design for each modification is performed, reviewed, and approved for conformance with applicable requirements;
5) the design is translated into controlled working drawings, instructions, and procedures for implementation and reviewed to assure that the translation is accurate;
6) a controlled inspection plan, which includes specific inspection criteria, is prepared with particular emphasis on workmanship standards and special process inspections and testing, including preoperational tests;
7) a controlled safety plan, which includes specific safety criteria, is prepared with particular emphasis on personnel safety and those practices which could affect environmental health and safety issues;
8) a controlled installation or implementation plan is prepared sequencing the work steps, criteria, inspection hold and witness points, tests, and specific safety requirements encountered at each phase of installation, including personnel qualification levels;
9) a controlled work package(s) including the controlled working drawings, procedures, instructions, inspection plan, installation plan, and safety plan is prepared, reviewed, and approved for adequacy and accuracy;
10) once approved, the work package is released for work;
11) any revisions to the work package are controlled, reviewed, and approved prior to their incorporation, with focus on how the revision affects work already completed;
12) deficiency documentation is incorporated, as it is written, into the quality assurance nonconformance reporting system and into the package in a controlled manner;
13) the tracking status of the package is maintained, including any authorization for work scope deviations or additions, or for activities while awaiting deficiency resolution; and,
14) a mechanism is developed for assuring that work is complete, has been reviewed, and that the work package adequately and accurately reflects the completed work through a final review and inspection process.

QA-36, Section 7, Design Control

Reference: Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), Executive Summary pages 16 and 24; XI.A.2 pages 1-23; XI.A.3 pages 1-3; and XI.B.4 page 1.

1. Program Requirements

It is the responsibility of Alyeska to provide for the establishment and execution of a quality assurance program for the TAPS design which is consistent with the provisions of the TAPS Agreement and the following supplemental design control requirements.

Alyeska may delegate to other organizations the work of establishing and executing the quality assurance program, or any part thereof, but Alyeska shall retain responsibility for overall program effectiveness. Alyeska shall be able to demonstrate this effectiveness in a timely manner when so requested by regulatory authorities.

It is the responsibility of Alyeska design engineering to identify and incorporate into a Q List all structures, systems, and components which are quality-related. In addition, it is the responsibility of Alyeska design engineering to identify all services which are quality-related and to assure that they are included in the procurement quality assurance program. It is the responsibility of Alyeska quality assurance to verify that all quality-related structures, systems, components, and services have been properly identified and appropriately incorporated into the Q List and/or the procurement quality assurance program.

In no way shall the Alyeska design control quality assurance program operate to diminish the responsibility of any contractor for the quality of services furnished.

The design responsibilities and interfaces among the contributing organizations, both internal and external, shall be identified and controlled.

Clear provisions shall be identified in the design control program for announced and unannounced periodic audits, inspections, surveillances, reviews, and evaluations of the effectiveness of the programs in achieving quality objectives. Cause determination and corrective action, including a comprehensive trending and root cause analysis program, shall be an integral part of the design control program in the correction of deficiencies and in prevention of their recurrence.

2. Program Procedures And Instructions

Procedures and instructions shall be developed to assure: that design activities are carried out in a planned, controlled, integrated, orderly, and correct manner; and that the design bases and regulatory requirements have been adequately translated into controlled procedures, instructions, specifications, and drawings. At a minimum, these procedures and instructions shall include the following as applicable:

1) responsibilities of organizations involved in the design control program, including other contractors;
2) responsibilities within design organizations;
3) technical information exchanges across internal discipline interfaces and external interfaces;
4) test requirements and criteria;
5) document control, including review, alternate review, approval, release, distribution, revision, and an engineering definition listing which identifies the latest status of design documents.
6) required precision measuring and test equipment;
7) maintenance and retention of design documents;
8) management review of status and adequacy of the program;
9) training of personnel performing design activities;
10) identifying design input;
11) preparation and revision of design documents;

12) specifying quality levels, acceptance criteria and standards, and record requirements;
13) performance of design verifications by testing or review;
14) alternate calculations;
15) conducting audits of design activities, their reporting and follow-up; and,
16) taking lasting corrective action.

Applicable design inputs, such as design bases, regulatory requirements, codes, and standards, shall be identified and documented in each applicable design records file and their selection reviewed and approved. Changes from specified design inputs, including the reasons for the changes, shall be identified, approved, documented, and controlled.

3. Design Input Requirements

The design input shall include but is not limited to the following, where applicable:

1) basic performance functions of each structure, system, and component;
2) performance requirements, such as normal operating parameters, capacity, rating, pressure, temperature, and system output;
3) codes, standards, and regulatory requirements, including the applicable issue date and/or addenda;
4) design limits and conditions, such as capacity, rating, pressure, temperature, medium chemistry, and voltage;
5) alternate calculations;
6) environmental conditions including, as a minimum, geophysical, fauna, and flora, thermal, water run-off, weather, and harsh conditions, and seismic loads and conditions;
7) interface requirements, including definition of the functional and physical different discipline interfaces involving structures, systems, and components;

8) material requirements, including compatibility, electrical capacity, electrical insulation properties, fire rating properties, protective coatings, and corrosion resistance;

9) mechanical requirements interface, such as torque motor set points, electrical breaker trip values, vibration, stress, shock, and reaction forces;

10) structural requirements, including such items as equipment foundations, mainline and non-mainline pipe supports and restraints, electrical equipment, wiring, cable supports and restraints, antennas, buildings, wharves and piers, roads, and water courses;

11) hydraulic requirements, such as pump net positive suction heads, allowable pressure drops, and allowable fluid velocities;

12) electrical requirements such as the National Electric Code (NEC), wiring and connection methods, the source of power, voltage, raceway requirements, electrical insulation and motor requirements;

13) layout and arrangement requirements;

14) operational requirements, including normal operating conditions, pipeline shutdown, emergency operation, specific or infrequent operation, and system abnormal operation;

15) instrumentation and control systems requirements, including maintenance, calibration and testing of indicating instruments, and controls and alarms required for safe operation of the pipeline. Other requirements such as the type of instrument, scaling of instrumentation devices, instrumentation line slope requirements, spares, range of measurement, and location of indicators;

16) human factors layout of control systems; access and administrative control requirements for pump station, Valdez Marine Terminal, and pipeline safety and security;

17) redundancy, diversity, electronic data protection, electrical and fire separation requirements of structures, systems, and components;

18) failure effects requirements, including single-point failure and risk assessment of structures, systems, and components, including a definition of those events and accidents which they must be designed to withstand;
19) test and inspection requirements and criteria, including corrosion control and monitoring, pump station and pipeline tests and the conditions under which they will be performed;
20) accessibility, maintenance, repair, and in-service inspection requirements for quality-related systems, including the pipeline and girth weld integrity, and the conditions under which these will be performed;
21) personnel requirements and limitations, including the qualification/certification and number of personnel available for normal pipeline and Valdez Marine Terminal operation, emergency response activities at each of the pump stations, the Valdez Marine Terminal and SERVS, preventive, corrective, and predictive maintenance, testing and inspection;
22) transportation requirements from the various pump station topping units and the Valdez Marine Terminal, including Department of Transportation (DOT)/Interstate Commerce Commission (ICC) regulations;
23) fire protection or resistance requirements;
24) handling, storage, and shipping requirements;
25) suitability of materials, processes, parts, and equipment;
26) safety requirements for preventing personnel injury, including gas emission monitoring, developing an approved chemical consumables list and a transient combustibles program, restricting the use of hazardous/dangerous materials, escape provisions from enclosures, and grounding of electrical systems; and,
27) other requirements to prevent undue risk to the health and safety of the public, the environment, and the ecosystem.

4. **Design Analyses**

Engineering design analyses and failure mode analyses, such as seismic, environmental, and stress, as a minimum, shall be performed in a planned, documented, controlled, and correct manner, in sufficient detail to permit verification and auditing. The analyses shall be legible and in a form suitable for microfilming or scanning and reproduction, filing, and retrieving. Analyses shall be sufficiently detailed as to purpose, method, assumptions, design input, references, and units such that an individual technically qualified in the subject can review and understand the analyses and verify the adequacy of the results without recourse to the originator. Calculations shall be identifiable and readily retrievable by: subject (including structure, system, or component), originator, reviewer, alternate reviewer, and date; or by other data such that the calculations are readily retrievable and auditable.

Design analysis procedures shall include requirements for:

1) identifying documents and records files to permit timely reference and retrieval;
2) defining the objective of the analysis; definition of design inputs and their sources; documenting the results of literature searches, industry seminars, or other applicable background data;
3) documenting engineering assumptions, their bases, and identifying those assumptions which must be verified as the design proceeds;
4) identification of computer calculations, including computer type, code or programming inputs and outputs; and
5) review and approval.

5. **Drawings**

Procedures shall be established for the preparation, review and approval, and control of drawings for structures, systems, and components. The following subjects are to be included, as a minimum:

1) drafting standards,
2) symbols, including standardized symbols;
3) identification system;
4) indication of revision status;
5) checking method;
6) review and approval requirements;
7) reproduction, issuance, and distribution;
8) storage and control of originals or master copies;
9) as-built drawing verification;
10) modification of as-built drawings to reflect existing field conditions;
11) modification of system and as-built drawings to reflect approved changes to the hardware configuration; and,
12) nonconformance with drawing requirements.

6. Specifications

Procedures shall be established for the preparation, review, and control of specifications for structures, systems, and components. The following subjects are to be included, as a minimum:

1) format requirements;
2) identification;
3) subject and content;
4) criteria;
5) review and approval requirements;
6) issuance and distribution;
7) revisions;
8) modification of as-built specifications to reflect existing field conditions;
9) modification of as-built specifications to reflect approved changes to the hardware configuration;
10) nonconformance with specification requirements; and,

11) storage, control, and retrievability of originals or master copies.

7. **Other Design Documents**

Procedures shall be established for the preparation and control of additional design documents, such as installation instructions, maintenance instructions, and inspection and test procedures. The following subjects are to be included, as a minimum:

1) format requirements;
2) identification system;
3) prerequisites;
4) criteria;
5) review and approval requirements;
6) issuance and distribution;
7) revisions;
8) nonconformance with design document requirements; and,
9) storage, control, and retrievability of originals or master copies.

8. **External And Internal Interface Control**

The design interfaces between organizations performing quality-related work shall be identified and shall include those activities and organizations affecting or affected by the scope of design, criteria, specifications, workmanship standards, and technical direction of the design program. Responsibilities shall be defined in sufficient detail to include the preparation, review, and approval of documents involving design interfaces.

The communication of needed design information across established design interfaces, including changes as work progresses, shall be proceduralized. These procedures shall identify the positions and titles of personnel in the communication channels and their responsibilities for decisionmaking in the resolution of problems and for providing and reviewing information and taking action.

Design information transmitted from one organization to another shall be documented in specifications, drawings, or other controlled documents which are uniquely identified and issued by authorized persons. Documentation requesting information or action shall be processed in accordance with written procedures to ensure that the response and the request can be related.

9. Design Verification

Procedures shall be developed and applied to verify the adequacy of design. Design verification may be performed by any competent individuals or groups other than those who performed the original design but who may be from the same organization. The results of design verification efforts shall be clearly documented, with the identification of the verifier clearly indicated. Documentation of results shall be auditable against the verification methods identified by the responsible design organization.

The extent of the design verification required of a structure, system, or component is a function of its importance to safety, the complexity of the design, the degree of standardization, the state of the art, and the compared similarity with previously proven designs in its application.

Acceptable design verification methods include but are not limited to:

1) design reviews;
2) alternate calculations; or,
3) qualification testing.

a. Design Reviews

Design reviews are critical reviews to provide assurance that design documents such as drawings, calculations, analyses, or specifications are correct, satisfactory for the application, and implement the proper regulatory requirements and design

bases. Design reviews may range from multi-organizational reviews to single-person reviews. The depth of review may range from a detailed verification of the complete design to a limited check of such aspects as the design approach and the results obtained. The results of the review shall be documented and action taken to assure that any findings are implemented.

b. Alternate Calculations

Alternate calculations shall be performed by a person or persons other than those who performed the original calculation. A review shall also be performed to evaluate the appropriateness of assumptions, input data, and the code or other calculation methods used. The alternate method must adequately verify the calculation or analyses but may be a more simplified approach or less rigorous, such as a hand calculation to verify the computer code output.

c. Qualification testing

The qualification testing methods shall be specified and documented in a test procedure and shall demonstrate adequacy of the total design performance under the most adverse design conditions. Where a test may only verify a specific design feature, the remaining design features shall be verified by other means (e.g., design review, alternate calculations). The test procedure shall incorporate the format, requirements, test methods/sequence of test steps, prerequisites, and acceptance criteria. The test procedure shall require quality verification of the test setup and configuration, that all prerequisites have been accomplished, that only calibrated precision measuring and test equipment has been used and logged by an instrument control number, that the operators are qualified/certified testers, and that the test was conducted in accordance with the test procedure requirements. When test results indicate that modifications to the item are necessary to obtain acceptable performance, the test results shall be documented on a nonconformance report and

dispositioned by engineering for corrective action and initiation of a design change.

10. Design Change Control

Quality assurance design change control provisions shall include the organizational responsibility for coordinating necessary revisions to drawings and other design documents with the interfacing TAPS implementing operating procedures and instructions. The implementing procedures and instructions shall include, as a minimum:

1) Standard Operating Procedures;
2) Maintenance Instructions, including preventive, corrective, test, and inspection;
3) safety procedures;
4) the organizational responsibility for providing training procedures and criteria for operating, maintenance, inspection, test, and safety personnel;
5) evaluation for suitability, prior to selection, of materials, parts, and components which are standard commercial (off-the-shelf) or which have been previously approved for a different application;
6) design documents, specifications, drawings, procedures, and instructions which reflect regulatory requirements and design bases;
7) design documents which specify Alyeska quality requirements;
8) internal and external design interfaces between organizations participating in design modifications sufficient to assure that such modifications are adequately controlled, including the review, approval, release, and distribution of design documents and revisions;
9) requirements that personnel responsible for design change verification not include the original designer or the designer's immediate supervisor;
10) requirements that design verification be performed to verify the adequacy of the design change, and that such verification be performed using the most adverse specified design conditions;

11) requirements for design changes to be reviewed to assure that design parameters are defined and constructible, and that inspection and test criteria are identified;

12) requirements that any errors or deficiencies found in the design process or the design itself be documented on a nonconformance report, and that corrective action be taken;

13) requirements that revisions to design be incorporated in a timely manner into appropriate design documents, specifications, drawings, procedures, and instructions;

14) requirements that such revised design documents, specifications, drawings, procedures, and instructions be controlled and distributed;

15) requirements that design records activities and design changes be collected, centrally stored in the engineering design records files, maintained, and readily retrievable for review and auditing; and

16) the development and maintenance of interface control documents including drawings, procedures, and instructions such that the interrelationship of design changes is identified and the changes to such documents are controlled and implemented.

11. Audits

A comprehensive system of planned and documented audits shall be carried out by quality assurance with engineering support to verify compliance with all aspects of the Quality Assurance program for design, including those procedures delineating quality assurance actions required during the design process. The audit process must include both internal and external audits and must include the examination of design activities, processes, documents, and records. In addition to regularly scheduled audits and surveillances, unannounced audits may be performed.

The audit process shall verify, as a minimum, the following:

1) that all quality-related structures, systems, and components have been properly identified by design engineering and incorporated into the Q List;
2) that all services which are quality-related have been properly identified by design engineering and that all such services have been included in the procurement quality assurance program;
3) that environmental and seismic requirements have been considered;
4) that regulatory and design basis inputs have been correctly selected and incorporated into the design;
5) that engineering assumptions which are necessary to perform the design activity have been adequately described, and that they are easy-to-understand, reasonable, and supportable by engineering analysis, calculations, or standard accepted industry practice;
6) that all assumptions which are to be identified for subsequent re-verifications when the detailed design activities are completed have been adequately identified;
7) that appropriate quality requirements and quality assurance requirements have been specified;
8) that all applicable codes, standards, and regulatory requirements, including issue and addenda, have been properly identified and that their requirements for design have been met;
9) that all trends and operating/maintenance experience have been considered;
10) that design interface requirements (both internal and external) have been satisfied;
11) that an approved design method has been used;
12) that the output compared to inputs has been determined to be reasonable;
13) that the specified parts, equipment, and processes are suitable for the required application;
14) that the specified materials are compatible with each other and the design environmental conditions to which the materials will be exposed;
15) that adequate maintenance and human factors features have been satisfied;
16) that special process considerations have been met;

17) that the acceptance criteria which are incorporated in the design documents are sufficient to allow verification that design requirements have been satisfactorily accomplished;

18) that adequate test requirements have been appropriately specified;

19) that adequate handling, storage, cleaning, and shipping requirements have been specified;

20) that adequate identification requirements have been specified;

21) that material test and certification requirements have been specified;

22) that the design records file contains applicable PROF's, significant reports, meeting minutes, letters, etc., relating to progress, status, and control of the engineering and design process;

23) that inadvertent synergistic effects of changes have been considered;

24) that components have been properly classified;

25) that a risk assessment has been performed;

26) that design information is current and correct;

27) that the as-built condition is accurately reflected in procedures, instructions, and drawings;

28) that design engineers have sufficient technical guidance and experience to perform the functions conducted; and

29) that quality assurance personnel have sufficient technical guidance and experience to perform the functions to be conducted in regard to these quality assurance requirements for design control; where necessary or desirable, quality assurance personnel shall be supplemented by engineering personnel to provide technical expertise.

Audits of the design program shall be conducted on a routine scheduled basis, and with sufficient frequency to establish and/or verify the adequacy of, and conformance to, the design quality assurance requirements. Unannounced audits or surveillances shall also be performed when one or more of the following conditions exists:

1) when it is necessary to determine or verify the capability of a subcontractor's quality assurance program; such an audit shall be performed prior to awarding or extending the scope of a purchase order for design services;
2) when, after award of a purchase order, sufficient time has elapsed for the implementation of the purchase order recipient's quality assurance program for design and it is appropriate to determine that the organization is performing the functions as defined in the quality assurance program description, codes, standards, and other purchase order requirements;
3) when substantive/significant changes are made in functional areas of the quality assurance program for design, including reorganization and process/procedure revisions;
4) when trends or generic implications of deficiencies/nonconformances in the quality assurance design program are identified;
5) when the need for a systematic, independent assessment of program effectiveness or item quality, or both, is identified; or,
6) when the need for verification of required corrective actions has been identified.

QA-36, Section 8, Control of Documents

Reference: Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), Executive Summary page 33 and XI.B.5 pages 1-11.

Measures shall be established for a Document Control function which is responsible for maintaining and controlling the issuance of documents such as procedures, instructions, and manuals, including vendor manuals, technical bulletins, specifications, and drawings, including changes thereto, which prescribe all activities affecting quality.

1. Control Process

Documents, and changes thereto, shall be reviewed for adequacy and approved for issue by authorized personnel in accordance with written procedures. These procedures shall identify those individuals or groups responsible for reviewing, approving, and issuing documents and revisions thereto. This review process shall include interdepartmental reviews for completeness and technical adequacy by the affected organizations. These reviews shall include a review for quality-related aspects by quality assurance.

Approved documents, and changes thereto, shall be controlled and promptly distributed through a centralized document control facility or its satellite operations to ensure availability by the user prior to commencement of work.

Changes to documents shall be reviewed and approved in the same context as original procedures by the same organization which performed the original review and approval, unless another qualified organization is designated in writing.

A master equipment list, including those structures, systems, and components to be covered by the quality assurance program, shall be maintained and updated through the document control process.

Master status lists identifying the current revision of documents shall be updated and utilized to preclude the use of superseded documents.

Master controlled distribution lists shall be maintained.

A system to distribute updated controlled documents shall be maintained, including a method to assure that obsolete documents are identified as such and that copies (other than properly identified file copies) are destroyed to prevent their inadvertent use.

2. **Audits**

A comprehensive system of planned audits and surveillances shall be carried out to verify compliance with all aspects of the Quality Assurance program for the control of documents. The audit/surveillance process shall verify that only current and controlled documents are being used at the various TAPS work locations.

QA-36, Section 9, Procurement

Reference: Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), Executive Summary page 41; XI.A.3 pages 1-3; and XI.B.10 pages 1-4.

Measures shall be established for the control of procurement documents for quality-related components, materials, and services.

1. Procurement Document Contents

Procurement documents, such as purchase specifications, shall contain or reference the following as documents which are applicable and with which compliance is required by each supplier of quality-related components, materials, and services:

1) The design basis technical requirements, including applicable regulatory requirements, material, and component identification requirements, drawings, specifications, codes and industrial standards, and test and inspection requirements, including hold points.

2) The applicable requirements with which the supplier's QA program must comply and which must be described in the supplier's QA program; or, identification and verification of characteristics critical to the quality function of the procured item in order to provide reasonable assurance that the item will perform its intended quality-related function.

3) Identification of the documentation to be prepared, maintained, or submitted by the supplier to Alyeska for review and approval. These documents may include, as necessary and as determined by procedure, inspection and test records, qualification records, or code-required documentation.

4) Identification of those records to be retained, controlled, and maintained by the supplier, and those delivered to Alyeska prior to use or installation of the hardware.

5) Alyeska's right of access to the supplier's facilities and records for source inspection and audit.
6) Requirements for the supplier reporting and dispositioning of nonconformances from procurement requirements.
7) Requirements for the supplier to respond to corrective action requests submitted by Alyeska for programmatic deviations/deficient conditions from procurement requirements.
8) Provisions for extending applicable requirements of the procurement documents to lower-tier suppliers.

Provisions shall be included which require a feedback mechanism from field activities into the procurement files for both materials and services. Quality-related information such as nonconformance reports, audit reports, corrective action requests, surveillance reports, and fitness-for-duty results, shall be forwarded to procurement for inclusion in vendor/supplier files for review and action. As a minimum, Alyeska shall perform, during its review and action, trending of the information by vendor suppliers and across vendor suppliers.

2. Procurement Document Control

Alyeska procurement documents shall be prepared, reviewed, approved, and controlled in accordance with written procedures which clearly delineate the sequence of actions to be accomplished and which identify the individuals or groups responsible for accomplishing such actions. These procedures shall include provisions for review of procurement documents by the quality assurance organization as required by the Q list. This review shall be performed in a manner such as to ensure that quality requirements are incorporated and correct, and that procurement requirements for spare, renewal, or replacement parts are equivalent to or better than those included in the design for the original equipment. Documentary evidence of such review and approval process shall be

retained and available for verification. As a minimum, this evidence shall include positive verification, by checklist or equivalent means.

3. Quality Assurance Level Determination and Technical Requirements

Procedures shall be prepared for the determination of the level of quality assurance required for the procurement of an item or service. As required by these procedures, contractors and suppliers shall be evaluated by quality assurance personnel prior to award of a purchase order or contract to assure the contractor's or supplier's capability to comply with procurement document requirements. This evaluation shall be based on at least two (2) of the following:

1) A review of the supplier's quality assurance program description provided with the proposal/bid.
2) A review of historical evidence of the supplier's performance in providing similar items or services.
3) A pre-award survey of the supplier's facilities, control functions, and QA program.

Technical requirements for items and materials to be procured shall be developed by the design or engineering organization responsible for the modification or maintenance activity in accordance with controlled procedures. Procurement documents for quality-related items and materials shall be reviewed for inclusion of technical and quality assurance requirements by the Quality Assurance organization prior to initiation of the procurement action by the purchasing organization as appropriate based upon the Q list. The results of the quality assurance review shall be documented and retained in the quality assurance and procurement file for future reference.

4. Audits and Surveillances

Announced and unannounced surveillance, inspection, and audit of suppliers and contractors shall be conducted to assure compliance with quality requirements utilizing qualified personnel in accordance with written procedures, instructions, and checklists.

Surveillance, inspection, and audit of suppliers shall be performed to an extent consistent with the importance, complexity, and quantity of the item(s) being purchased, as procedurally defined, and for items on the Q list, Alyeska shall periodically confirm the validity of suppliers' certificates of conformance and material test reports. Quality verification records shall be reviewed by quality assurance personnel to assure their completeness and their compliance with procurement document requirements.

5. **Items and Service Acceptance Requirements**

Alyeska's methods used to accept an item or service from a supplier shall be source verification, receiving inspection, supplier certificate of conformance, post-installation test at the TAPS, or a combination thereof. Acceptance by source verification shall be considered when the item or service is vital to TAPS safety or difficult to verify quality characteristics after delivery or complex in design, manufacture, and test.

The source inspection or verification activity shall include but not be limited to verifying that:

1) documentation has been submitted as required and provides verification of approvals, material, applicable inspections and tests;
2) fabrication procedures and processes have been approved and complied with, and the applicable qualifications, process records, and certifications are readily available;
3) components and assemblies have been inspected, examined, and tested as required and applicable inspection, tests, and certification records are readily available;
4) nonconformances have been dispositioned as required;
5) components and assemblies are cleaned, preserved, packed, and identified in accordance with purchase order requirements.

Upon Alyeska's acceptance by source verification, documented evidence of acceptance shall be furnished to Alyeska as follows: the original documentation shall be retained at

the primary warehouses where the items are first received, and a statement of acceptance shall be furnished to the receiving destination of the item and to the supplier.

Measures shall be established for the control of purchased quality-related material, equipment, and services, including spare or replacement parts.

Receipt inspections shall be performed by certified quality control inspectors in accordance with written procedures and instructions to assure that:

1) Materials, equipment, or components are properly identified and correspond with associated documentation. The receiving inspector at the point of receipt shall have access to controlled specifications, component drawings, codes, standards, and vendor manuals as required in order to carry out receiving inspection activities, as well as adequate, properly calibrated measuring and test equipment to perform the inspection.
2) Inspection records or certificates of conformance attesting to the acceptance of materials, equipment, and components are completed and available prior to installation or use.
3) Materials, equipment, and components are inspected and judged acceptable in accordance with predetermined specific criteria and inspection instructions prior to installation or use.
4) Quality-related items accepted or released are physically identified as to their inspection status prior to forwarding them to a controlled storage area or releasing them for installation or further work.
5) Nonconforming items are clearly identified, controlled, and segregated until disposition is made.

Acceptance by post-installation test at the TAPS shall be satisfactory when performed following the accomplishment of at least one of the preceding methods and when:

1) it is difficult to verify the quality characteristics of the item without its being installed and in use; or
2) the item requires an integrated system check-out or test with other items to verify its quality characteristics; or
3) the item cannot demonstrate its ability to perform its intended function except when in use.

Post installation test requirements and acceptance documentation should be mutually established by Alyeska and the supplier.

QA-36, Section 10, Handling, Storage, Packaging, and Shipping

Reference: Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), XI.B.16 pages 1-10.

Alyeska shall develop, document, maintain, and implement a program to control handling, storage, packaging, and shipping, including cleaning, maintenance, and preservation of TAPS quality-related materials and equipment in accordance both with established engineering criteria and with work and inspection procedures, instructions, specifications, or drawings. This program shall be developed and implemented to prevent damage, deterioration, and loss, and stored equipment shall be maintained in accordance with preventive maintenance requirements.

1. Program Elements

The documented program for particular items, special coverings, special equipment, and special protective environments such as inert gas atmosphere, specific moisture content levels, and temperature levels shall be specified, provided, and their existence verified.

For critical, sensitive, perishable, or high-value materials or equipment, specific written procedures, instructions, or checklists shall be developed which incorporate the engineering criteria for handling, storage, maintaining, packaging, preservation, and shipping requirements.

Special handling tools and equipment shall be identified, provided, and controlled to ensure safe and adequate handling and storage.

Special attention shall be given to providing instructions for marking and labeling for preparation, storage, packaging, and shipment of items. Marking or other identifying means shall be adequate to identify, maintain, and preserve the item, including indication

of the presence of special environments or the need for special protective measures and controls.

Adequate controlled facilities shall be provided with properly configured and protected storage arrangements. Provisions shall be made for the segregation of nonconforming items to preclude their inadvertent use and for items such as combustible materials, hazardous chemicals, and corrosives. Materials and equipment shall be stored out of walkways and shall not be stacked on the tops of the shelving and bins so as to pose a threat to worker safety or inhibit the ability of installed building sprinkler systems to adequately provide fire protection coverage.

2. Monitoring

Alyeska quality assurance shall perform periodic audits and surveillances at the various TAPS locations where handling, storage, packaging, and shipping activities are conducted, in order to verify compliance with these minimum requirements. Additionally, safety, fire protection, and security personnel shall perform periodic surveillances to verify compliance to safety and security requirements.

QA-36, Section 11, Identification and Traceability of Items

Reference: Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), XI.A.2 page 4, XI.A.6 pages 1-2, Executive Summary page 58, and X. pages 1-5.

1. Control of Purchased Items

The following requirements shall apply to the control of purchased material and equipment requiring traceability based upon the quality level specified in the Q list, including spare or replacement items:

1) When traceability of purchased materials, parts, or components, including partially fabricated subassemblies, is required by a specific purchase order, a program shall be developed which is verifiable and meets specific installation inspection or test records. The program shall provide for assuring that only correct and accepted items are used and installed, and shall assure that an installed item can be traced to a specific batch, lot, component, part, and/or purchase order number.

2) Physical identification shall be used as required by the Q list to the maximum extent possible. The markings shall be clear, unambiguous, and indelible, and applied so as not to affect the function of the item. Markings shall be transferred to each part of an item when subdivided, and shall not be obliterated, obscured, or hidden by surface treatment or coatings unless other means of identification are substituted prior to such obliteration, obscuring, or hiding.

3) Suppliers shall be required by procurement documents to establish a documented, auditable system of identification and control which is consistent with the above requirements.

2. Identification and Control of Materials, Parts, and Components

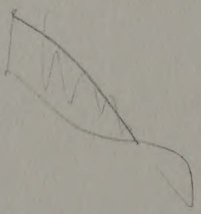
Requirements shall be established for the identification and control of quality-related materials, parts, and components, including spare or replacement items. These identification and control requirements shall be in place so that installed items can be readily identified to as-built drawings, procedures, and instructions. Materials, parts, and components shall be identified and controlled to prevent the use of incorrect or defective items.

Identification of quality-related items shall be maintained on the item in a manner that does not affect the function or quality of the item. In cases where identification is not practical or is impossible (e.g., quality-related mounting hardware), quality records shall be developed which allow traceability to the item.

Suppliers of quality-related materials, parts, or components which are on the Q list shall be required by procurement documents to establish a system of identification and control which is consistent with the above requirements.

Procedures or instructions implementing these requirements shall provide for the following:

1) verification that quality-related items received and installed are properly identified and can readily be traced to the appropriate documentation, such as drawings, specifications, purchase orders, manufacturing and inspection documents, nonconformance reports, and/or mill test report;
2) verification that quality-related items have been identified consistent with the inventory control system and are traceable to documentation which identifies the proper uses or applications of the item.
3) Alyeska quality assurance shall perform periodic audits and surveillances of the Identification and Traceability of Items program being conducted at, and in support of, the TAPS.



QA-36, Section 12, Special Processes

Reference: Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), Executive Summary page 58, XI.A.2 page 4, XI.A.6 pages 1-2, XI.B.15 pages 1-3; and X. pages 1-5.

A quality assurance program shall be developed and implemented by Alyeska for the identification and control of special processes. Special processes shall be selected when: inspection of processed material is impossible or disadvantageous; those fabrication, inspection/nondestructive test methods are of complex or specialized nature requiring interim or supplementary controls such as separate work instructions, qualification of machines/equipment and certified operators/ inspectors; processes are involved whereby material being worked or fabricated undergoes a physical, chemical, or metallurgical transformation where conformance to specifications cannot be verified by external visual inspection after processing; or, the process of nondestructive testing is involved.

The control of special processes for quality-related structures, systems, and components shall include such processes as welding, brazing, heat treating, castings, chemical cleaning, protective coatings, wiring and connection methods, concrete and grouting, and nondestructive testing, including the pig programs.

Special processes shall be performed by qualified and certified operators and inspectors using properly maintained and calibrated equipment and in accordance with written qualified procedures and instructions. These documents shall be reviewed by Alyeska quality assurance. Personnel, procedures, and instructions shall be qualified in accordance with applicable codes, standards (including workmanship standards), and specifications. Qualification records of special process procedures, instructions, and personnel shall be developed, filed, maintained as quality records, and readily available for verification.

Suppliers and contractors of quality-related materials, parts, components, or services involving special process applications and control shall be required by procurement documents to establish a special process program which is consistent with the above requirements and which has been audited and accepted as meeting those requirements by Alyeska quality assurance.

Alyeska quality assurance shall perform periodic audits and surveillances of the special process program being conducted at, and in support of, the TAPS.

QA-36, Section 13, Inspection and Testing

Reference: Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), Executive Summary pages 42 and 43; XI.B.6 pages 1-7

1. Inspection

Quality Assurance shall include the quality control inspection function which encompasses both general and nondestructive examination (NDE) activities. The quality control organization shall comprise those quality assurance actions related to the verification of the physical characteristics of a material, structure, system, or component to predetermined regulatory requirements, engineering design, and workmanship standards. The quality control function provides a real-time means to measure and control TAPS project quality by verifying conformance with documented procedures, instructions, and drawings.

1.1 Inspection Scope

Inspection activities, including examinations, measurements, or tests of materials or products and services shall be performed for each work activity where necessary by procedure, to assure project quality. If inspection of processed material is impossible or disadvantageous, indirect control by monitoring processing methods, equipment, and personnel shall be provided. Both direct inspection and process monitoring shall be provided when control is inadequate without both.

1.2 General Inspector Certification

Each general inspector shall be certified as being qualified to perform work in that particular discipline (e.g., mechanical, electrical, civil, structural, instrumentation and control). Each certification shall be supported by compliance with appropriate proceduralized criteria such as education or training, testing, evaluation, and periodic review to assure the initial and continued proficiency of each inspector.

1.3 Assignment Planning

Plans and procedures shall be developed for assigning or staffing and training an adequate number of qualified inspectors to perform the required inspections so as to allow sufficient time for TAPS specific assignments or selection and training of the required personnel. The need for specific or project-oriented training programs shall be determined, and such training shall be conducted to qualify personnel responsible for such functions.

1.4 Certification Period

The effective period of certification shall be established, and at the end of the effective period of certification, each inspector shall be recertified in accordance with the requirements of this section. Such recertification shall be required with sufficient regularity to assure that only qualified, trained personnel are performing inspections.

1.5 Training

Training programs shall include indoctrination of inspectors with: the technical and quality assurance requirements of the TAPS; the codes, standards, including workmanship standards, procedures, and instructions, and quality plans which are to be used; and the quality assurance elements which are to be employed, with an understanding regarding their limitations and capabilities. On-the-job training shall also be proceduralized and included in the program, with supervised hands-on experience gained through actual performance of inspection activities.

1.6 Performance Appraisal

The job performance of inspection personnel shall be evaluated within three (3) months of assignment and at periodic intervals not to exceed twelve months, and the results of each evaluation shall be reviewed to determine the capability, efficiency, and effectiveness of the inspector. If it is determined that the capabilities of an inspector are not in accordance with the qualifications specified for the job, that inspector shall be removed from

operations until such time as the inspector has been trained in the needed skill and has been re-certified to perform the work.

Contract inspectors who have a break of employment due to lack of work circumstances and are re-employed in the same discipline(s) within less than nine (9) months from the date of termination may retain the original valid certification(s). When the break of service exceeds nine (9) months, retraining and re-certification shall be required. All returning contractors, regardless of the break of service, must attend a reindoctrination to TAPS project requirements, including procedural changes in the discipline(s) encompassing the inspectors' work assignment(s).

1.7 General Qualification Requirements

The qualification of personnel shall be documented in an appropriate form. The certificate shall include the following information, as a minimum:

a) name of individual being certified;
b) activities individual is qualified to perform;
c) level of qualification;
d) effective period of certification;
e) basis used for certification; and
f) signature of Alyeska's Designated Representative.

The qualification requirements contained herein are the minimum capabilities which qualify quality control general inspection personnel to perform quality assurance functions for the TAPS.

Three (3) levels of capability for persons who perform inspection, or who participate in the approval of inspection plans or procedures, the handling of inspection data or results, or the control of reports and records, are delineated below.

The education and experience requirements specified for the various levels should not be treated as absolute when other factors provide reasonable assurance that an individual can competently perform a particular task. Other factors may be demonstrated capability in a given job or responsibility through previous performance and experiences.

The three (3) levels of capability and the requirements for each are as follows:

Level I. To be considered for certification, a candidate must satisfy the following requirements:

a) Two years of related experience in equivalent inspection or testing activities; or ✓

b) High school graduation and 6 months experience; or ✓

c) Associate degree and 3 months experience. ✓

Level II. To be considered for certification, a candidate must satisfy one of the following requirements:

a) One year as a Level I; or ✓

b) High school graduation and 3 years experience; or

c) Associate degree and 1 year of experience; or

d) 4 year college degree and 6 months experience.

Level III. To be considered for certification, a candidate must satisfy one of the following requirements:

a) Six years experience as a Level II; or

b) High school graduation and 10 years experience; or

c) High school graduation and 8 years experience with 2 years as a Level II; or

d) Associate degree and 7 years experience; or

e) 4 year college degree and 5 years experience.

1.8 Specific Required Capabilities for Inspection Personnel

1) Physical. Each person who performs inspections shall be physically capable of performing his assigned task. Characteristics that should be considered are:

   a) natural or corrected near-distance acuity such that the applicant is capable of reading J-1 letters on standard Jaeger's test type chart for near-vision or equivalent test type;

   b) color vision; and

   c) other medical requirements for the physical demands of performing the required activities (such as heart or circulatory conditions).

   Appropriate requirements shall be met at the time of initial certification and shall be verified annually by reexamination. Records of examination shall be placed in the personnel file.

2) Technical Inspection Capabilities

   A *Level I* person shall have experience or training in the performance of the inspections which he/she is required to perform. He/she shall be familiar with the tools and equipment to be employed and shall have demonstrated proficiency in their use. He/she shall be familiar with inspection and measuring equipment calibration and control methods and shall be capable of verifying that the equipment is in proper condition for use.

   A *Level II* person shall have all the qualifications of a Level I person and shall have experience and training in the performance of required inspections and evaluation of the results of the inspections. He/she shall be capable of supervising or maintaining surveillance over the inspections performed by others.

   A *Level III* person shall have all the qualifications of a Level I person and shall have broad experience and formal training in the performance of

inspections and shall be educated through formal courses of study in the principles and techniques of the inspections to be performed. He/she shall be capable of planning and supervising inspections, reviewing and approving procedures, and evaluating the adequacy of activities to accomplish objectives. He/she shall be capable of organizing and reporting results and of certifying the validity of results.

Records of each person's personnel qualifications shall be established and maintained as quality records for a period of five (5) years. The file shall contain records, in auditable form, of past performance history, training, initial and periodic evaluations, and certification of each person.

2. Testing

The Alyeska Quality Assurance Program shall provide for the testing of quality-related systems, equipment, and structures. The program shall include, as a minimum: calibration of precision measuring and test equipment (PM&TE); pig runs; post-maintenance testing; and post-modification testing.

2.1 Test Procedures

Alyeska shall be responsible for the development of test procedures for these activities. Each test shall be accomplished in accordance with written test procedures by qualified and certified test personnel.

Test procedures shall provide:

1) that all prerequisites for those items of work have been completed prior to establishing initial conditions for the test, including as a minimum:
    a) calibrated instrumentation;
    b) adequate and appropriate equipment;
    c) initial conditions and completeness of the item to be tested; and,
    d) suitable environmental conditions.

2) special precautions which identify items needed for safety of personnel or equipment; special precautions for extraordinary attentiveness to operational circumstances;
3) instructions for sequentially performing the test by identifying steps to conduct the test, observations to be made, data to be recorded;
4) acceptance criteria against which the success or failure of the test can be determined;
5) interfacing with Alyeska plant analysis for the determination of hold and witness inspection points;
6) means for collecting, documenting, or recording test data and results;
7) the review and acceptance of test results by qualified and certified personnel to assure acceptability; these records shall be retained as quality verification records and shall be readily retrievable.

The quality assurance program for controlling the test program shall identify the necessary test procedures, the provisions to be included in those procedures, the method of reviewing and approving those procedures, the in-process and final inspection verification of those procedures, and the methods for documenting and evaluating the results.

2.2 Test Personnel Certification

Each Alyeska employee or contractor involved in quality-related testing or verification of testing requirements shall be certified as being qualified to perform such work. This certification shall be supported by appropriate proceduralized measures such as education or training, testing, evaluation, and periodic review to assure the initial and continued proficiency of each test technician or engineer.

The effective period of certification of Alyeska employees or contractor personnel who perform testing activities shall be established and at the end of the effective period of

certification, testing personnel shall be recertified in accordance with the requirements of this section.

2.3 Training

Training programs shall include indoctrination of testing personnel with: technical and related regulatory and quality assurance requirements of the TAPS; and the codes, standards, procedures, instructions, and drawings which are to be used. On-the-job training shall also be proceduralized and included in the program, with hands-on experience gained through actual performance of testing activities.

2.4 General Qualification Requirements

The qualification of testing personnel shall be documented in an appropriate form. The certificate shall include the following minimum information:

1) person being certified;
2) activities qualified to perform;
3) level of qualification;
4) effective period of certification;
5) signature of Alyeska's Designated Representative; and,
6) basis used for certification.

The qualification requirements contained herein are the minimum capabilities which qualify testing personnel to perform quality assurance functions for the TAPS.

Three (3) levels of capability for persons who perform testing, or who participate in the approval of test plans or procedures, the handling of test data or results, or the control of reports and records, are delineated below.

The education and experience requirements specified for the various levels should not be treated as absolute when other factors provide reasonable assurance that an individual can

competently perform a particular task. Other factors may be demonstrated capability in a given job or responsibility through previous performance and experiences.

2.5 Personnel Capabilities

The three (3) levels of capability and the requirements for each are as follows:

1) Level I Personnel Capabilities

A Level I person should be capable of performing and documenting the results of tests that are required to be performed in accordance with documented procedures, acceptance standards, and/or industry practices as defined in user's written procedures.

2) Level II Personnel Capabilities

A Level II person should have all of the capabilities of a Level I person for the test category or class in question. Additionally, a Level II person should have demonstrated capabilities in planning tests; in setting up tests, including preparation and setup of related equipment, as appropriate; in supervising or maintaining surveillance over the tests; in supervising and certifying lower level personnel; and in evaluating the validity and acceptability of test results.

3) Level III Personnel Capabilities

A Level III person should have all of the capabilities of a Level II person for the test category or class in question. In addition, the individual should also be capable of evaluating the adequacy of specific programs used to train and certify test personnel whose qualifications are covered by these requirements.

2.6 Education and Experience Qualifications

These education and experience recommendations should be considered with recognition that other factors commensurate with the scope, complexity, or special nature of the activity may provide reasonable assurance that a person can competently perform a

particular task. Other factors which may demonstrate capability in a given job are previous performance or satisfactory completion of capability testing. These factors and the basis for their equivalency should be documented.

1) Level I
    a) Two years of related experience in equivalent testing activities, or
    b) High school graduation and 6 months of related experience in equivalent testing activities; or
    c) Completion of college level work leading to an associate degree in a related discipline plus 3 months of related experience in equivalent testing activities.
2) Level II
    a) One year of satisfactory performance as a Level I in the corresponding test category or class; or
    b) High school graduation plus 3 years of related experience in equivalent testing activities; or
    c) Completion of college level work leading to an associate degree in a related discipline plus 1 year of related experience in equivalent testing activities; or
    d) Graduation from a 4 year college plus 6 months of related experience in equivalent testing activities.
3) Level III
    a) Six years of satisfactory performance as a Level II in the corresponding test category or class; or
    b) High school graduation plus 10 years of related experience in equivalent testing activities; or high school graduation plus 8 years of experience in equivalent testing activities with at least 2 years as a Level II and with at least 2 years associated with pipeline facilities -- or, if not, at least sufficient training to be acquainted with the relevant quality assurance aspects of a pipeline facility; or

c) Completion of college level work leading to an associate degree and 7 years of related experience in equivalent testing activities with at least 2 years of this experience associated with pipeline facilities -- or, if not, at least sufficient training to be acquainted with the relevant quality assurance aspects of a pipeline facility; or

d) Graduation from a 4 year college plus 5 years of related experience in equivalent testing activities with at least 2 years of this experience associated with pipeline facilities -- or, if not, at least sufficient training to be acquainted with the relevant quality assurance aspects of a pipeline facility.

Records of each person's personnel qualifications shall be established and maintained as quality records for a period of five (5) years. The file shall contain records, in auditable form, of past performance history, training, initial and periodic evaluations, and certification of each person.

Alyeska's quality assurance program shall provide for the inspection and verification of test hold and witness points, and shall provide for periodic quality assurance audits and surveillances to verify compliance with the regulatory and quality testing requirements.

3. Nondestructive Testing

Quality Control Inspectors, including contractors and suppliers of NDE services for quality-related structures, systems, and components of the TAPS shall be qualified and certified in accordance with the current edition of the American Society For Nondestructive Testing Recommended Practice No. SNT-TC-1A. Level III personnel shall be qualified by examination. The qualification/certification program is to include all applicable methods utilized at the TAPS included in paragraph 3, "Nondestructive Test Methods," of SNT-TC-1A.

NDE contract inspectors and suppliers of NDE services, including those contractors performing mainline piping corrosion and integrity monitoring programs, shall be included in the Alyeska quality assurance procurement and control process.

4. **Monitoring**

Quality assurance shall perform surveillances and audits to verify all aspects of the quality control inspection function which encompasses both general and nondestructive examination (NDE) activities.

QA-36, Section 14, Measuring and Test Equipment

Reference: Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), XI.A.3 pages 1-3.

The Alyeska Quality Assurance Program shall provide for the control of precision measuring and test equipment (PM&TE) used as the basis for acceptance in inspection, testing, operating, and measurement activities which affect quality and performance of the TAPS.

1. Procedures

Alyeska shall be responsible for the development of procedures for the PM&TE control program. These procedures shall delineate responsibilities for the implementation of this program and methods for the procurement, handling, storage, shipping, scheduling, and calibration of PM&TE and reference standards.

2. Pre-Award Surveys

Alyeska quality assurance shall perform pre-award evaluations/surveys of contractors and vendors, as applicable, as well as periodic audits and surveillances to assure adequate and effective implementation of the PM&TE program. These audits and surveillances shall verify that maintenance, calibration, and storage of PM&TE shall be accomplished under suitably controlled conditions. Controlled conditions shall include, as a minimum, the use of appropriate equipment and facilities; and suitable environmental conditions for accomplishing the activity, such as housekeeping, cleanliness, temperature, and humidity.

3. Reference Standards

PM&TE and reference standards shall be traceable to their calibration records. This traceability shall be documented and its record shall provide traceability in the event that the PM&TE or reference standards are found to be out of calibration. A documentation review shall be conducted to determine the validity of all inspection, test, and/or

measurement results gained through the use of the affected device since its last acceptable calibration. Corrective action measures shall be taken for items determined to be suspect.

PM&TE and reference standards shall be labeled or tagged to indicate the next calibration due date or otherwise controlled in accordance with approved procedures which ensure only PM&TE and reference standards with current calibration are utilized.

4. Calibration

Periodic calibration verification and adjustment of PM&TE shall be performed and controlled by qualified and certified testing personnel to assure that accuracy is maintained within limits necessary to verify that documented design and operating conditions have been met. PM&TE shall normally be calibrated against reference standards which have an uncertainty of no more than one-fourth (1/4) of the required uncertainty of the PM&TE being calibrated. If this 4:1 accuracy requirement ratio is not reasonably achievable, a documented, reviewed, and approved evaluation of the adequacy of the calibration shall be performed by the responsible discipline engineering organization/ function.

Calibration standards shall have an accuracy greater than or equal to the reference standards being calibrated. When equal accuracy is used, the basis for calibration shall be documented and approved by the Alyeska manager of the discipline responsible for the calibration.

5. Traceability

PM&TE and reference standards shall be traceable to nationally recognized standards or natural physical constants. Where no nationally recognized standard or natural physical constant exists, the basis for calibration shall be documented and approved by the Alyeska manager of the discipline responsible for the calibration.

6. Calibration Services

Contractor and supplier organizations which provide calibration engineering or calibration services to Alyeska shall be responsible for implementing documented measures to ensure that PM&TE accuracy is maintained within required limits. The PM&TE programs of these organizations shall be audited by Alyeska quality assurance QA and shall satisfy the Alyeska PM&TE program requirements.

QA-36, Section 15, Control of Nonconforming Items

Reference: Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), XI.B.8 pages 1-4.

NONCONFORMANCE PROGRAM

Alyeska shall develop, document, maintain, and implement a quality assurance program for the identification and control of items, services, procedures, and processes which do not conform to requirements. This program shall encompass all quality-related activities and shall provide, as a minimum, a systematic method and procedures for:

1) defining responsibilities;
2) defining nonconformances;
3) identifying nonconformances;
4) notifying affected organizations;
5) segregating or otherwise quarantining nonconformances, where practical;
6) documenting and reporting nonconformances;
7) controlling further processing, delivery, or installation of a nonconforming item pending a decision on its disposition;
8) identifying individuals or organizations responsible for dispositioning nonconformances;
9) reviewing, accepting, rejecting, repairing, or reworking nonconformances in accordance with documented procedures;
10) implementing remedial action for nonconformances;
11) reinspecting repaired or reworked items in accordance with applicable procedures;
12) recording changes in as-built drawings, specifications, procedures, and instructions;
13) trending and generic implications; and,
14) preventing the recurrence of nonconformances.

1. **Responsibility**

The QA organization shall be responsible for developing and implementing the program for identification and control of nonconforming items, procedures, services, and processes, and assuring Alyeska compliance with the program. Functional managers are responsible for assuring nonconforming conditions are documented in their area of responsibility. Individuals are responsible for documenting nonconforming conditions in their area of responsibility. The QA organization shall verify that the respective functional managers meet their responsibilities. Functional managers shall assure that individuals documenting nonconformances are qualified by training and experience to identify and report nonconforming conditions in their areas of responsibility. As a minimum, individuals reporting deficiencies shall include: civil, electrical, instrumentation, and mechanical technicians and inspectors; process and safety personnel; and personnel performing audits and surveillances.

2. **Defining Nonconformances**

The QA organization shall develop and assure implementation of an integrated program for controlling nonconformances and nonconforming conditions on quality-related activities and functions. This program shall include, as a minimum, and demonstrate by examples, nonconformances and nonconforming conditions for:

1) items such as systems, components, assemblies, parts, and appurtenances;
2) documentation, specifications, procedures, instructions, and drawings; and,
3) functions, processes, services and activities.

The program shall also include provisions for in-process exceptions to nonconforming conditions such as those occurring during maintenance activities. Under no condition shall the in-process exceptions be used or applied to other than the specific item classes or activity classes described in the provision.

3. Nonconformance Identification

The QA organization shall assure that the handling or processing of quality-related deficiencies arising from the various Alyeska deficiency reporting systems (such as operations, maintenance, and engineering discrepant conditions) other than the typical nonconformance system do not conflict with or subvert the requirements of the nonconformance system. Alyeska may elect to have a single nonconformance reporting system apply to all quality-related deficiencies. The QA organization shall develop and implement controlled measures to assure that quality-related functions and activities:

1) have and implement deficiency documenting procedures sufficient to detail any deficiencies in characteristic of the function or activity;
2) have controlled procedures requiring deficiency documents to state the apparent cause of the deficiency and the remedial corrective action taken; and,
3) have copies of the deficiency documentation forwarded to the QA organization.

For nonconforming items or conditions (such as procedures, processes, etc.), the quality assurance program shall assure that these items or conditions are physically identified as nonconforming at the time they are determined to be nonconforming.

4. Notifying Affected Organizations

The QA organization shall develop and assure the implementation of controlled measures that specify:

1) notification and prompt distribution of the nonconformance reporting documents to groups or organizations impacted or potentially likely to be impacted by the nonconformance; and,
2) distribution for disposition, remedial and cause determination, corrective action, and closure.

5. Nonconformance Segregation

The QA organization shall develop and assure the implementation of controlled measures to segregate nonconforming items from conforming items. Similar measures shall be developed for nonconforming conditions when they arise, such as procedures and processes. These measures shall include, as a minimum:

1) physically tagging or marking the item when possible;
2) physically separating the item from conforming items when possible;
3) specifying under what conditions, if any, the item, procedure, system, service, or process may be used; and,
4) specifying that no work or use of the item, procedure, system, service, or process will occur without release by the appropriate organization.

6. Nonconformance Reports and Documentation

The QA organization shall develop and implement controlled measures that define and describe nonconformance reports and supporting documentation as well as the qualifications required for personnel to execute these reports and supporting documents. These reports and documents shall, as a minimum and when combined, include:

1) the specific nonconforming item or condition;
2) the specific requirement(s) violated by the nonconforming condition;
3) the specific characteristic(s) found to be nonconforming;
4) the general item or condition found to be nonconforming (e.g., relief valve, training procedure, etc.);
5) the date the nonconformance was discovered;
6) the date the reports or documents were generated, if different from item 5) above;
7) the signature and position of the person generating the report;
8) the group discovering the nonconformance (e.g., electrical inspection, maintenance technicians, etc.);

9) the discipline and organization responsible (e.g., electrical maintenance, mechanical operations, electrical control room, instrumentation engineering, etc.);
10) the location and shift (e.g., Pump Station 1, 1st shift);
11) the concurrent activity or condition if relevant (e.g. piping project, rewiring project, QA audit, earthquake, etc.);
12) the disposition;
13) the dispositioning organization;
14) the signature of the person providing the disposition;
15) the cause and generic implications determination;
16) the signature of the person providing the determination;
17) the remedial corrective action implemented and the date implementation was completed;
18) the signature of the person verifying the remedial corrective action was implemented correctly and completely;
19) the corrective action implemented and the date the implementation was verified;
20) the signature of the person verifying the corrective action was correctly implemented;
21) the closure date; and,
22) the signature of the person closing the report/document.

7. Conditional Release of Nonconforming Items

The QA organization shall develop and implement controlled measures that define and describe provisions for the conditional release of nonconforming items. These provisions shall include, as a minimum:

1) release of only a limited number of items;
2) release of items for an emergency condition given that there is a high probability of subsequent acceptance of the item;
3) release of items to meet a critical schedule given that there is a high probability of subsequent acceptance of the item;

4) all quality requirements for the item must be met prior to final acceptance of the item;
5) release of items with known quality defects is prohibited unless an interim disposition is provided;
6) release of items whose quality status has not yet been determined is allowed (e.g., incomplete tests, missing certified material report);
7) released items will be physically tagged or visibly marked as conditionally released items and carry unique identification allowing tracking;
8) released items will be tracked by location and use; and,
9) released items will be promptly brought into final acceptance status.

8. Dispositioning Organization

The QA organization shall develop and assure implementation of controlled measures specifying the identification of individuals, groups, or organizations responsible for dispositioning nonconformances.

9. Nonconformance Review and Disposition

The QA organization shall develop controlled measures which assure that nonconformances are reviewed and dispositioned by the responsible organization. As a minimum, the review shall be performed in accordance with controlled procedures and include a documented analysis that determines whether the items shall be:

1) used in their nonconforming condition;
2) repaired to meet the specified and approved criteria and then used;
3) reworked in accordance to specified and approved criteria and then used; or
4) rejected;
5) if any of the first two dispositions are elected, the analysis shall, as a minimum, clearly document:
    a) the basis for the disposition;

b) that the analysis complies with design change procedures and other design change requirements;

c) the extent of decay of the design safety margin resulting from the nonconformance;

d) any negative synergism that may arise in its application or the system or process application; and,

e) the extent of decay of the design safety margin resulting from negative synergism.

Nonconforming conditions shall be tracked and analyzed on a continuing basis by the engineering organization on at least a system by system basis so that the design safety margin is known and an acceptable margin of safety is maintained. Engineering shall also specify any restrictions on operating or special maintenance requirements for the nonconforming items.

Dispositions shall, as a minimum, include:

1) use-as-is;
2) repair;
3) rework; or
4) reject.

They shall be documented on the nonconformance report and signed by the dipositioner. The signature shall indicate, at minimum, that the analysis process has been accurately and adequately performed.

10. Nonconformance Remedial Action

The QA organization shall develop and implement controlled measures to assure that the nonconformance dispositions are implemented adequately and in a timely manner. The QA organization shall verify that the remedial action for each nonconformance was

adequately performed and completed and shall attest to this by signature on the nonconformance report.

11. **Reinspection**

The QA organization shall verify that controlled measures are implemented to assure that any items that are dispositioned as repair or rework are inspected in accordance with and for conformance to controlled procedures, instructions, drawings, and specifications for the item being repaired or reworked.

12. **Recording of Changes**

The QA organization shall verify that controlled measures are implemented which specify and describe how changes occurring as a result of the nonconformance process are recorded in as-built drawings, specifications, procedures, and instructions as dictated by the scope of the nonconformance.

13. **Trending and Generic Implication Analysis**

The QA organization shall develop and implement controlled measures to assure that nonconformances are analyzed for trends and generic implications, and the specific action to take based on these analyses is defined. Alyeska may elect to have this analysis performed under the corrective action program. As a minimum, the analysis shall include identification and consideration as to cause of:

1) other similar nonconformances; and,
2) the implication that the instant nonconformance casts on other similar items.

14. **Nonconformance Corrective Action**

The QA organization shall develop and implement controlled measures to assure that the nonconformance reports and documents are submitted in a timely manner to the corrective action program for determination of corrective action. The QA organization shall verify

that the corrective action for each nonconformance was adequately implemented and completed, and shall attest to this by signature on the nonconformance report.

15. Closure of the Nonconformance Report

The QA organization shall develop measures to assure that each nonconformance report is complete and closed. As a minimum, these measures shall require:

1) report closure by signature; and that,

2) the report is complete in that all signature blocks have been signed and are legible, all steps have been completed or adequately justified, and all pertinent documentation accompanies the report and is legible.

QA-36, Section 16, Corrective Action

Reference: Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), XI.B.2 pages 1-2.

In any organizational environment, corrective action is essential from the perspective of correcting problems and preventing or minimizing their recurrence. Prerequisites to a successful corrective action program or system include an effective deficiency identification system (nonconformance system) and the organizational recognition that problem resolution and problem analysis (and subsequent resolution) are paramount in implementing effective and efficient organizational practices.

In the Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), section XI.B.2, Corrective Action, it was found that the corrective action program was insufficient to provide remedial or lasting corrective action so as to preclude recurrence of conditions adverse to quality.

CORRECTIVE ACTION PROGRAM

Alyeska shall develop and implement a corrective action program. This program shall encompass all quality-related activities as a minimum. It shall provide a systematic method for:

1) identifying deficiencies;
2) trending deficiencies;
3) evaluating the severity of the deficiencies identified;
4) assessing the cause and corrective action of each deficient condition;
5) assessing the root cause(s) of the deficiencies which are significant conditions adverse to quality;
6) determining and implementing remedial corrective actions; and
7) determining and implementing lasting preventative corrective measures.

1. **Responsibility**

   The QA organization shall be responsible for: developing and implementing the corrective action program; assuring Alyeska compliance with the program; and developing and leading the effort required for evaluation of deficiencies, assessment of root causes, determining corrective actions, and assuring that corrective actions are promptly and adequately implemented as well as lasting.

2. **Deficiency Identification**

   Deficiencies are managed via a nonconformance system and various other systems used to document inspection, surveillance, audit, operations, maintenance, and engineering discrepant conditions. The QA organization shall develop and implement controlled measures to assure that all activities affecting quality-related functions and activities:

   1) have and implement deficiency documenting procedures sufficient to detail any deficiencies in characteristic important to the function or activity;
   2) have controlled procedures requiring deficiency documents to state the apparent cause of the deficiency and the remedial corrective action taken; and
   3) have copies of the deficiency documentation forwarded to the QA organization.

3. **Deficiency Trending**

   The QA organization shall develop and implement methods to categorize deficiencies in a manner sufficient to reveal underlying trends or potential trends in deficient condition occurrences and characteristics. Information to be categorized for each deficiency shall include, as a minimum:

   1) specific item or characteristic found deficient;
   2) severity of deficiency;
   3) general item or characteristic found deficient (e.g., relief valve, training procedure, etc.);
   4) deficiency description (a brief description of the deficiency);
   5) cause of the deficiency (this to be input once root cause determination is made);

6) date deficiency was discovered;
7) group discovering deficiency (e.g., electrical inspection, maintenance technicians, etc.);
8) discipline and organization (e.g., electrical maintenance, mechanical operations, electrical control room, instrumentation engineering, etc.);
9) location and shift (e.g., Pump Station 1, 1st shift);
10) concurrent activity or condition (e.g., piping project, rewiring project, QA Audit, earthquake, etc.);
11) remedial corrective action implemented and date implementation was completed; and
12) preventative corrective action implemented and date implementation was completed.

The QA organization shall assure that all deficiency procedures require documentation of the categories listed above, as well as any additional categories chosen by Alyeska. They shall also assure that procedures exist within the QA organization which clearly define from both a quantitative and qualitative perspective:

1) a negative or adverse trend;
2) action to take when an adverse trend is identified; and
3) frequency of observation or review required to discover adverse trends.

4. Deficiency Severity

The QA organization shall develop and implement measures to rank the severity of the quality-related deficiencies for each of several topics. The rankings shall be justified in writing for each element and topic and shall include elements to assure coverage of the following topics as a minimum:

1) potential (and, if known, actual) impact on health, safety, the environment and ecosystem;

2) potential (and, if known, actual) impact on performance of the intended function or purpose;
3) potential (and, if known, actual) impact on control of the intended function or purpose;
4) potential (and, if known, actual) impact on reliability; and
5) potential (and, if known, actual) impact on meeting quality and regulatory requirements.

The rankings shall also incorporate any repetitive deficiencies and information from the trending of deficiencies, which shall increase the severity of the ranking. Alyeska may choose to use additional topics for ranking, such as production costs or quality costs; but, if used, these topics shall not serve to diminish the severity rankings of the topics listed above. The basis for the severity rankings shall be reviewed at least annually, or more frequently if there are related changes in corporate policy or regulatory requirements to consider. These reviews shall be procedurally described and documented when performed. Procedures describing the ranking process shall include multiple, realistic examples for each severity rank with a description of the rationale used to arrive at the ranking.

5. Root Cause Analysis

Root cause analysis is the core of the corrective action program. A successful analysis yields the true cause of the deficiency(ies) or problem(s) under review. With this true or root cause, it is much more likely that lasting preventative action can be achieved. Root causes, for all but the simplest problems, are often less than obvious. This reinforces the need for a systematic approach to root cause determination.

Typically, root cause analysis involves a detailed and systematic review of cause and effect conditions in the sequence leading to the problem or deficiency at hand. It is important to consider all potential causes, no matter how insignificant they may seem at the outset of

the review. Similarly, it is important to consider related deficiencies and their previously determined resolutions.

The severity of the deficiency often tends to obscure the analysis process. Root cause analysis is one discipline where relatively non-severe deficiencies should be given as much or more attention as extremely severe deficiencies, since seldom does a major problem or a catastrophic problem occur without first surfacing as a minor deficiency or sequence of minor deficiencies. A successful root cause analysis program can significantly assist in the identification and resolution of problems prior to their escalation to major problems.

The QA organization shall develop multiple techniques of root cause analysis based as a minimum on:

1) Direct Derivational Analysis;
2) Barrier Analysis;
3) Change Analysis;
4) Event and Causal Factor Analysis;
5) Root Cause Code Tree Analysis;
6) Management Oversight and Risk Tree Analysis; and
7) Fault Tree Analysis.

Procedural instructions shall be developed describing when and how to use these analysis techniques including additional techniques Alyeska may elect to implement.

The QA organization shall obtain and maintain adequate staff (in numbers and qualifications) to function as lead personnel in a multi-disciplinary team environment to perform root cause analyses for deficiencies as they arise. This shall include, where necessary in order to assure sufficient technical expertise for resolving complex, complicated deficiencies, obtaining technical expertise from throughout the entire organization and, where necessary to acquire adequate expertise, from outside Alyeska.

The QA organization shall maintain responsibility and control of team efforts. The QA lead personnel for a given team, while not required to be expert in the particular discipline under analysis, shall have demonstrated and sufficient knowledge, understanding, and experience in the corrective action process and techniques as well as sufficient general knowledge and understanding in the discipline to effectively direct, control, and achieve a thorough and successful analysis. Team members, if any are required, shall be chosen for their relevant discipline expertise for the deficiency at hand. They shall be trained in the corrective action process and techniques to be employed to the extent necessary to assure that their expertise can be utilized in the process. Team members shall be selected from groups in management chains separate from the management chain responsible for the deficiency. In no case shall a team member's immediate supervisor (and preferably such supervisor's immediate superior) be in the chain of command which was responsible for the deficiency. These requirements shall be reflected in controlled procedures.

The QA organization shall develop an initial root cause analysis plan, which shall be procedurally described, for each significant deficiency. Multiple, similar deficiencies may be evaluated under the same plan. The plan shall be approved by the manager of the corrective action program and shall set forth as a minimum:

1) identification and description of the deficiency(ies);
2) analysis techniques to be employed including justification for their selection;
3) a proposed team for the analysis with justification for each member's role;
4) an anticipated schedule for completing the analysis; and
5) any anticipated additional resource requirements.

Once the plan is approved, the QA organization shall have the authority to acquire team members. Team members shall be provided from within the Alyeska organization unless the requested member has been assigned to an emergency task. In this case an alternate member shall be provided.

Once the initial backlog of deficiencies is resolved, team size and qualifications shall be sufficient to complete each analysis within thirty (30) calendar days from identification of the deficiency/problem. In the rare case where this time limit cannot be met, the manager of the QA organization and the manager of the affected organization shall both authorize an extension of not more than thirty additional days to complete the analysis. This authorization shall include written and documented justification for the extension.

Once approved procedures are in place, the initial backlog of deficiencies shall be processed as follows:

1) existing open deficiencies and all new deficiencies as they occur shall be categorized for trending and ranked for severity;
2) the manager of the QA organization and the manager of the corrective action program shall determine a schedule for analysis after receiving inputs on criticality of the deficiencies from each affected manager;
3) the schedule shall consider the criticality inputs from the affected managers, any trends that may be visible, the QA severity rankings, and the total number of deficiencies to be analyzed;
4) the QA organization shall be allowed to acquire sufficient dedicated resources to complete the analyses within six months;
5) those deficiencies evaluated as most critical, on the basis of the status and importance of the activities, shall be worked first;
6) once the initial scheduling is complete, a review, trend categorization, and severity ranking of all deficiencies from 1990 to date shall be performed;
7) past resolutions to those deficiencies shall be reviewed in accordance with controlled procedures and either approved with written justification or rejected as inadequate and reconsidered under the new process;
8) the manager of the QA organization and the manager of the corrective action program shall review these rejected deficiencies with the affected managers and acquire their input on criticality;

9) the QA organization shall be allowed to acquire sufficient dedicated resources to complete the analyses of these rejected deficiency resolutions within twelve months; and

10) those rejected deficiency resolutions evaluated as most critical, on the basis of the status and importance of the activities, shall be worked first.

When the plan has been implemented and the analysis has been completed, a root cause analysis report shall be generated by the team leader. Time for writing the report should be allocated in the plan, and a typical format followed that is procedurally described. The report, as a minimum, shall contain:

1) the plan used to perform the analysis including the team member(s) performing it;

2) a detailed presentation of the steps taken and results drawn in carrying out the analysis (this presentation shall be of sufficient clarity and detail such as to allow a qualified individual to review it and reach a similar conclusion);

3) a clear description of the root cause(s) of the deficiency(ies);

4) a section for a dissenting opinion by another team member(s); (This section shall be included in each report whether or not a dissenting opinion exists. If none exists, it shall be indicated that none exists. While a team is expected to generally reach a consensus opinion, this will not always be the case. Each member of the team has the responsibility to prepare a dissenting opinion if they hold one. The dissenting opinion(s), if such exists, shall be presented in the same detail as the primary opinion and root cause and carry the burden of clearly demonstrating the difference between the two conflicting opinions. The dissenting opinion section shall have signature blocks to be used by those with the dissenting opinion. If the team does not reach consensus, the team leader's opinion shall be denoted as the primary opinion.);

5) approval signatures and date by the RCA Team Leader and the Manager of Plant Analysis signifying participation in the process and agreement with the conclusions drawn; and

6) approval signature and date by the manager of the corrective action program signifying that the report complies with the procedures and that the opinions have been presented in a clear manner.

Dissenting opinions are important to document since they may prove crucial in furthering the analysis process, particularly in the early phases of program implementation. Often they arise when there are in fact multiple root causes or contributing causes with which team members have varying degrees of experience or knowledge. The more experienced team members become, as the skill levels of the team leaders improve and team members become more familiar with the process, the fewer dissenting opinions may be likely to occur. Team leaders and the manager of the process should exhibit diligence in keeping the initial scope of the analysis as broad as possible in order to prevent the inadvertent elimination of potential root causes from consideration. The implementing procedures shall be devised so as to assure this diligence. These procedures shall also provide quantitative methods to measure the effectiveness of the analysis process. The primary variable for measuring effectivity is lack of deficiency/problem recurrence once preventative action has been implemented. If similar problems continue to appear after preventative action has been implemented, the analysis techniques shall be reviewed and improved as appropriate and necessary to assure an effective root cause analysis program.

6. Remedial Corrective Actions

Remedial corrective action is the initial action taken to remedy the adverse or deficient condition identified. It is a reactive type of action and typically is dictated solely by the deficient condition. These actions are usually initiated by groups other than the QA organization and are most often hardware related.

The QA organization shall develop and implement controlled measures to assure that all Alyeska groups or organizations which define or implement remedial corrective actions to quality-related components, systems, functions, processes, or activities do so in

accordance with controlled procedures and that these procedures require forwarding copies of the documentary evidence of the actions taken to the QA organization.

7. Preventative Corrective Action

Preventative corrective action is the action taken to prevent or minimize future recurrence of the deficiency(ies) or problem(s). These actions are generally more extensive than remedial actions and may entail significant revisions in design, processes, process controls, procedures, or programs including the quality program. The basis for the preventative action(s) is the root cause of the deficiency(ies) as determined by the root cause analysis process.

The QA organization shall develop and implement controlled measures to assure that:

1) the root cause of deficiencies is adequately and accurately translated into preventative action(s);
2) the QA organization shall have the lead position in any team that may be assembled to draft the preventative action(s);
3) the preventative action(s) is implemented in a timely manner; and
4) the preventative action is successful in eliminating or minimizing the future recurrence of the deficiency(ies).

If the preventative action is not implemented in a timely manner or a consensus on what the preventative action should be cannot be achieved, the QA organization shall be required to issue a Corrective Action Request (CAR) or a stop work order on the related process or activity. Such stop work order shall remain in place until consensus has been gained and corrective action has been implemented. Controlled, documented measures shall address the issue of timeliness directly, and provide clear guidance as to what is and is not timely for the various degrees of severity and the topics covered, so that quick action is assured for more severe deficiencies or adverse trends. In each case of severe deficiencies or severe adverse trends, the QA organization or upper management shall

inform the JPO promptly by telephone or facsimile transmission with follow-up written notification within twenty-four (24) hours of the initiation of such stop work order. In no instance shall the perceived financial cost be allowed to outweigh the potential adverse impact on the health and safety of the public, employees and contract personnel, and/or the environment/ ecosystem. In a worst-case scenario, this shall include the cessation of transport of oil through the pipeline until such time as the preventative action is implemented and such protection of the health and safety can be assured.

These controlled measures shall achieve the breadth and scope of those detailed in the section on root cause analysis. They shall also address the special processing of the initial preventative actions expected from the backlog of deficiencies.

8. Corrective Action Program Verification

The QA organization shall assure that controlled measures are developed and implemented to audit and survey the corrective action program and the preventative corrective actions which have been implemented. These measures shall assure that the requirements and intents set forth in this section have been adequately and accurately translated into implementing procedures and that the implementing procedures are being accurately implemented. They shall further assure that any revisions to the implementing procedures continue to meet the requirements and intent set forth in this section. Since this program is central to problem resolution, it shall be reviewed, audited, and surveyed at frequencies substantially above those used for other activities.

QA-36, Section 17, Quality Records

Reference: Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), Executive Summary page 24, XI.B.12 pages 1-2.

Alyeska shall provide a centralized document control program and procedures for the collection, storage, and maintenance of quality assurance records associated with the design, manufacture, construction, and operation activities of the TAPS.

1. Applicability

The requirements of the program shall apply to the work of any individual or organization which participates in collection, storage, filing, or maintenance and disposition of quality assurance records associated with the TAPS project.

Procurement shall specify quality record requirements to its vendors/contractors in the procurement documents depending upon the nature of scope of the work to be performed and the importance of the item or service involved.

2. Responsibility

A centralized records management function with satellite activities at the various TAPS locations shall be established. It shall be the responsibility of records management to establish and interface/integrate with the functional Alyeska managers to assure that the practices and procedures are in compliance with this section. Alyeska shall assure availability of the resources in terms of personnel, facilities, and services necessary to implement an adequate records management function to support the total quality records activities.

It is the responsibility of the functional managers to develop implementing procedures which identify the quality records produced in accordance with this report section.

3. Categories

Two categories of quality assurance records shall be established: lifetime and non-permanent.

Lifetime quality records are those which meet one or more the following criteria:

1) those records which are included in maintaining, reworking, repairing, replacing, or modifying a quality-related structure, system, or component (hereinafter referred to as an item);
2) those engineering, installation, inspection, maintenance, or testing records which could be used in determining the cause of an accident or malfunction of an item;
3) those records which demonstrate the capability for safe operation; and
4) those records which provide required baseline data for in-service inspection.

Lifetime quality assurance records shall be required to be maintained for the life of the particular item while it is installed or stored for future use.

Non-permanent quality records are those which meet all of the follow criteria:

1) those of no value in demonstrating capability for safe operation;
2) those of no value in maintaining, reworking, repairing, replacing, or modifying the item;
3) those of no value in determining the cause of an accident or malfunction of an item; and,
4) those which do not provide baseline data for in-service inspection.

Non-permanent records are required to show evidence that an activity was performed in accordance with the applicable requirements but need not be retained for the life of the item.

4. Technical Requirements

Quality records shall be legible, microfilmable, completely filled out, and identifiable to the item involved. Quality records shall be valid only if stamped, initialed, signed, or otherwise authenticated and dated by authorized personnel. If quality records are initialed, a master list shall be maintained on a lifetime basis of the full name, signature, and initials of each individual whose initials are affixed to such quality records. All quality records shall either be the original or a certified true reproduced copy.

Alyeska, in its retention of quality records in computerized form, shall comply with the following restrictions:

1) For each computerized storage record system to be utilized for the storage of both lifetime and non-permanent quality records, Alyeska shall obtain and retain in its lifetime files a letter from the manufacturer of the specific storage medium setting forth:
2) manufacturer's name, address, telephone number, and telephone number for technical support;
3) specific brand name, size, type, and other identifying information of storage medium;
4) name, specific edition, manufacturer's name, address, and telephone number of computer program(s) utilized;
5) an affirmation by the manufacturer(s) of the storage medium of the length of time for which such storage medium can accurately and reliably be retained without loss or damage to information contained therein;
6) should the length of time affirmed by the manufacturer be less than the lifetime of the item covered by the computerized quality record, in the instance of **lifetime** quality records, appropriate and sufficient steps shall be taken to assure that lifetime storage of records can be achieved; should the length of time affirmed by the manufacturer be less than the minimum period of time as recommended in Appendix A, in the instance of non-permanent quality records, appropriate and

sufficient steps shall be taken to assure that storage of records can be achieved for the recommended period of time.

7) In addition to computerized quality records which are to be retained on a **lifetime** basis, each such record shall also be retained for a minimum of five years in hard copy (paper) form; at the end of such five-year period, Alyeska shall be allowed to substitute adequate and sufficient back-up computerized storage for the hard copies, provided that such computerized storage is properly stored as set forth herein under Storage, Preservation, and Safekeeping of Quality Records, and that the records are in a location sufficiently remote from the storage site of the original computerized records to assure retention and prompt retrievability from at least one of the two locations.

8) In addition to computerized quality records which are to be retained on a non-permanent basis, each such record shall also be retained for a minimum of two years in hard copy (paper) form; at the end of such two-year period, Alyeska shall be allowed to substitute adequate and sufficient back-up computerized storage for the hard copies, provided that such computerized storage is properly stored as set forth herein under Storage, Preservation, and Safekeeping of Quality Records, and that the records are in a location sufficiently remote from the storage site of the original computerized records to assure retention and prompt retrievability from at least one of the two locations.

The quality records shall be listed in a controlled index which shall be maintained by records management. The index shall indicate, as a minimum, record retention times, the file(s) where the records are stored, and the location of the records within the storage area.

The index system used by the functional managers for the retention of TAPS project records shall include identifying information to be compatible with the master index

system generated by records management for final storage of records. The identification shall permit traceability between the record and the item or activity to which it applies. The quality records shall be classified either as "Lifetime" or "Non-permanent."

Quality records may be corrected or supplemented in accordance with procedures which provide for the method and review or approval by the originating organization. The correction shall not be initiated with "white-out" or correction tape. Corrections shall be made with a single line drawn through the item(s) to be corrected using ink, and include the date and the identification (signature or initials) of the individual authorized to issue such corrections or supplements.

Types of quality records with minimum retention periods are listed in Appendix A hereto. The nomenclature of these records may vary. For specific records not listed in Appendix A, the type most nearly describing the quality record shall be followed with respect to its retention period.

For records generated prior to commercial operation, the retention period shall begin on the date of commercial operation. For records generated on items installed after commercial operation, the retention period shall begin on the date upon which satisfactory operation of the item, as part of a system, has been demonstrated. For periodic maintenance, inspection, and test records, such as calibration records, generated after the date of commercial operation, the retention time shall begin on the date of their generation. When a record is generated as a result of an operational phase activity, the classification of those records shall be the same as those types of records generated during the initial construction period.

The responsible functional manager shall establish in writing the retention times of records not listed in Appendix A.

5. Receipt of Records

Records Management, including satellite operations, shall designate an individual(s) responsible for receiving the records. The individual(s) shall organize and implement a system of receipt control of quality records. This system shall apply to the receipt of records into a temporary working file and the master permanent storage file. As a minimum, the receipt control system shall include:

1) a records checklist designating the required quality records;
2) a record of quality records received; and,
3) procedures for receipt and inspection of incoming quality records.

Each receipt control system shall be structured to permit a current and accurate assessment of the status of quality records during the receiving process.

6. Storage, Preservation, and Safekeeping of Quality Records

a. Storage

Prior to storage of records in a quality records file, a written storage procedure shall be prepared and a custodian shall be designated with the responsibility, authority, and independence to enforce the procedure. This procedure shall include the following as a minimum:

1) a description of the storage area;
2) the filing system to be used;
3) a method for verifying that the records received are in agreement with the transmittal document and that the records have been received in good condition;
4) the rules governing access to, and control of, the files;
5) a method for maintaining control of, and accountability for, records removed from the storage facility; and,

6) a method for filing supplemental information and disposing of superseded records.

b. Preservation

Records shall be stored in a manner approved by the organization(s) responsible for the files. In order to preclude deterioration of the records, the following requirements shall apply:

1) *Condensation.* Provisions shall be made in the storage arrangement to prevent damage from condensation.
2) *Loose Records.* Records shall not be stored loosely. They shall be firmly attached in binders or placed in folders or envelopes for storage on shelving in containers. Steel file cabinets are preferred.
3) *Special Processed Records.* Special processed records (such as radiographs, photographs, negatives, and microfilm) which are light-sensitive, pressure-sensitive, or temperature-sensitive shall be packaged and stored as recommended by the manufacturer of these materials. Computerized records (both original and back-up copies) shall be packaged and stored as recommended by the manufacturer of these materials and in accordance with the requirements set forth in this section.

c. Safekeeping

A security system shall be established to preclude the entry of unauthorized personnel into the storage area. This system shall guard against larceny and vandalism.

7. Facility

Permanent and temporary record storage facilities shall be constructed or located so as to protect contents from possible destruction by causes such as fire, flooding, tornadoes, insects, rodents, magnetic fields, and from possible deterioration by a combination of extreme variations in temperature and humidity conditions.

A satisfactory alternative to the establishing of a dedicated record storage facility is maintenance of duplicate records stored in a separate remote location.
For storage of film and other special processed records, humidity and temperature controls shall be provided to maintain an environment as recommended by the manufacturer.

8. Audits

An audit system shall be established to assure that the quality records storage system is effective. The following shall be performed as a minimum:

1) periodic surveys to assure that records logged in are available and have been placed in their proper location within the files, and to assure that the control system is adequate;
2) periodic audits to assure that the facilities are in good condition and that the temperature/humidity controls and protective devices are functioning properly;
3) periodic audits of the records to assure that the documents are not deteriorating due to improper storage practices or rough handling;
4) periodic audits to provide the above assurances for records retained by contractors/ suppliers/vendors; and
5) unannounced audits of both Alyeska and contractors/suppliers/vendors when required to assure that these organizations are in compliance with the requirements for quality records set forth in this section.

9. Accessibility

Storage systems shall provide for the accurate retrieval of information. A list shall be generated designating those personnel who shall have access to the files.

Quality records maintained by a contractor/supplier/vendor at his/her facility or other location shall be accessible to Alyeska, in the case of lifetime records for the life of the items involved and for the designated retention periods for non-permanent records.

10. Disposition of Non-Permanent Records

Records classified as non-permanent shall be retained for at least the minimum period of time as recommended in Appendix A. After this time, these records may be disposed of by, or with concurrence of, Alyeska.

APPENDIX A

The following is a list of types of records with the recommended minimum retention periods indicated. In the nonpermanent column the number indicates the retention period in years after which the record need not be maintained.

The 0 years minimum recommended retention period is intended to permit disposition of the records on the day following the date of commercial operation. One year retention is intended to require maintenance of the record for the customary periods of warranty. Two year retention is intended to require maintenance of the record through the first overhaul or turnaround. Five and six year retention is intended to achieve compliance with regulatory requirements.

Record Types	Lifetime	Nonpermanent
A.1 Design Records		
Applicable Codes and Standards Used in Design	X	
As-Constructed Drawings	X	
Design Calculations and Record of Checks	X	
Design Change Requests		1
Design Deviations	X	
Design Procedures and Manuals		2
Design Reports	X	
Design Review Reports		1
Drawing Control Procedures		2
Purchase and Design Specifications and Amendments	X	
QA System Audit Reports		6
Reports of Engineering Surveillance of Field Activity		1

Record Types	Lifetime	Nonpermanent
A.1 Design Records (Continued)		
Safety Analysis Report	X	
Stress Reports	X	
Systems Descriptions	X	
Systems Process and Instrumentation Diagrams	X	
Technical Analysis, Evaluations, and Reports	X	
A.2 Procurement Records		
Audit Reports		6
Purchaser Order (Unpriced) Including Amendments		2
Receiving Records		0
Supplier's Quality Assurance Program Manual		2
A.3 Manufacturing Records		
Applicable Code Data Reports	X	
As-Built Drawings and Reports	X	
Certificate of Inspection and Test Personnel Qualification		0
Certificates of Compliance	X	
Cleaning Procedures		0
Eddy-Current Examination Procedure		2

Record Types	**Lifetime**	**Nonpermanent**
A.3 Manufacturing Records (Continued)		
Eddy-Current Examination Final Results	X	
Electrical Control Verification Test Results		2
Ferrite Test Procedure		2
Ferrite Test Results	X	
Forming and Bending Procedure Qualifications		0
Heat Treatment Procedures		0
Heat Treatment Records	X	
Hot Bending Procedure		0
Inspection and Test Instrumentation and Tooling Calibration Procedures and Records	(Until Recalibrated)	
Liquid Penetrant Examination Procedure		2
Liquid Penetrant Examination Final Results	X	
Location of Weld Filler Material	X	
Magnetic Particle Examination Procedure		2
Magnetic Particle Examination Final Results	X	
Major Defect Repair Records	X	
Material Properties Records	X	
Nonconformance Reports	X	
Packaging. Receiving, Storage Procedures		0
Performance Test Procedure and Results Records	X	
Pipe and Fitting Location Report	X	

Record Types	**Lifetime**	**Nonpermanent**
A.3 Manufacturing Records (Continued)		
Pressure Test Procedure		2
Pressure Test Results	X	
Product Equipment Calibration Procedure	**(Until Recalibrated)**	
Product Equipment Calibration Records	**(Until Recalibrated)**	
QA System Audit Report		6
QA Manuals, Procedures and Instructions		2
Radiographic Procedures		2
Radiographic Review Forms and Radiographs	X	
Welding Materials Controls Procedures		2
Welding Personnel Qualifications and Data Reports		2
Welding Procedure Qualifications and Data Reports		2
Welding Procedures	X	
Work Processing and Sequencing Documents		2
A.4 Installation-Construction Records		
A.4.1 Receiving and Storage		
Inspection Reports for Stored Items		0
Nonconformance Reports	X	
Receipt Inspection Reports on Items		1
Receiving, Storage, and Inspection Procedures		2

Record Types	**Lifetime**	**Nonpermanent**
A.4.1 Receiving and Storage (Continued)		
Storage Inventory and Issuance Records		0
Vendor Quality Assurance Releases		0
A 4.2 Civil		
Aggregate Test Reports		1
Batch Plant Operation Reports		1
Cement Grab Sample Reports		0
Concrete Cylinder Test Reports and Charts	X	
Concrete Design Mix Reports	X	
Concrete Placement Records	X	
Material Property Reports on Reinforcing Steel	X	
Material Property Reports on Reinforcing Steel Splice Sleeve Material	X	
Material Property Reports on Steel Embedments in Concrete	X	
Material Property Reports on Steel Piling		1
Material Property Reports on Structural Steel and Bolting	X	
Mix Water Chemical Analysis		1
Pile Drive Log	X	
Pile Loading Test Reports	X	
Reinforcing Steel Splice Operator Qualification Report		0
Release to Plate Concrete		0
Reports of High-Strength Bolt Torque Testing		1
Slump Test Results		0
Soil Compaction Test Reports	X	

Record Types	Lifetime	Nonpermanent
A 4.2 Civil (Continued)		
User's Tensile Test Report on Reinforcing Steel		1
User's Tensile Test Reports on Reinforcing Steel Splices		1
A.4.3 Welding		
Ferrite Test Procedures		2
Ferrite Test Results	X	
Heat Treatment Procedures		0
Heat Treatment Records	X	
Liquid Penetrant Test Procedures		2
Liquid Penetrant Test Final Results	X	
Magnetic Particle Test Procedures		2
Radiographic Test Procedures		2
Radiographic Test Final Results	X	
Ultrasonic Test Procedures		2
Ultrasonic Test Final Results	X	
Weld Fit-Up Reports		1
Weld Location Diagrams		2
Weld Procedures	X	
Weld Procedures Qualifications and Results		2
Welding Fill Metal Material Reports	X	
Welding Materials Control Procedures		2
Welding Personnel Qualifications		2

Record Types	Lifetime	Nonpermanent
A.4.4 Mechanical		
Chemical Composition User's Test (Grab Samples) for Thermal Insulation		1
Chemical Test of Water Used for Mixing Insulation Cement		1
Cleaning Procedures and Results		1
Code Data Reports	X	
Construction Lifting and Handling Equipment Test Procedures, Inspection and Test Data		0
Data Sheets or Logs on Equipment Installation, Inspection and Alignment		2
Documentation of Systems Check-Off (Logs or Data Sheets)		1
Erection Procedures for Mechanical Components		1
Hydro-Test Procedures and Results	X	
Installed Lifting and Handling Equipment procedures, Inspection and Test Data	X	
Lubrication Records		6
Material Property Records	X	
Material Property Test Reports for Thermal Insulation	X	
Pipe and Fitting Location Reports	X	
Pipe and Fittings Material Property Reports	X	
Pipe Hanger and Restraint Data	X	
Safety Valve Response Test Procedures	X	
Safety Valve Response Test Results		6
A.4.5 Electrical and I&C		
Cable Pulling Procedures		0

Record Types	**Lifetime**	**Nonpermanent**
A.4.5 Electrical and I&C (Continued)		
Cable Separation Check List		**1**
Cable Splicing Procedures	**X**	
Cable Terminating Procedures	**X**	
Certified Cable Test Reports	**X**	
Documentation of Testing Performed After Installation and Prior to Systems Conditional Acceptance		**2**
Field Workmanship Checklist or Equivalent Logs		**1**
Instrument Calibration Results	**(Until Recalibrated)**	
Relay Test Procedures and Results	**X**	
Reports of Pre-Installation Test		**2**
Voltage Breakdown Tests	**X**	
A.4.6 General		
"As-Built" Drawings and Records	**X**	
Calibration of Measuring and Test Equipment and Instruments Procedures and Reports	**(Until Recalibrated)**	
Certificate of Inspection and Test Personnel Qualification		**1**
Field Audit Reports		**6**
Field Quality Assurance Manuals		**2**
Final Inspection Reports and Releases	**X**	
Nonconformance Reports	**X**	
Special Tool Calibration Records	**(Until Recalibrated)**	
Specifications and Drawings	**X**	

Record Types	Lifetime	Nonpermanent
A.5 Test Records		
Final Systems Adjustment Data	X	
Flushing Procedures and Results		2
Hydrostatic Pressure Test Procedures and Results	X	
Instrument AC Systems and Inverters Test Procedures and Reports	X	
Main and Auxiliary Power Transformer Test Procedures and Results	X	
Off-Site Power-Source Energizing Procedures and Test Reports	X	
On-Site Emergency Power Source Energizing Procedure and Test Reports	X	
Power Transmission Substation Test Procedures and Results	X	
Primary and Secondary Auxiliary Power Test Procedures and Results	X	
Station Battery and DC Power Distribution Test Procedures and Reports	X	
System Lubricating Oil Flushing Procedures		2
Records and Drawing Changes Reflecting Plant Design Modifications Made to Systems and Equipment	X	
Off-Site Environmental Monitoring Survey Records	X	
A.6 Operation Phase Activity Records		
Transient or Operational Cycling Records for Those Plant Components That Have Been Designed to Operate Safely for a limited Number of Transients or Operational Cycles	X	
Current Individual Plant Staff Member Qualifications, Experience, Training and Retraining Records	X	
In-Service Inspection Records	X	

Record Types	Lifetime	Nonpermanent
A.6 Operation Phase Activity Records (Continued)		
Principal Maintenance Activities, Including Inspection Repair Substitution or Replacement of Principal Items of Equipment		5
Abnormal Occurrence Records		5
Periodic Checks, Inspections and Calibrations Performed		5
Test or Experiment Records		5
Changes Made in the Operating Procedures		5

QA-36, Section 18, Quality Audits and Surveillances

Reference: Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), XI.A.3 pages 1-3; and XI.B.1 pages 1-6.

AUDITS

Alyeska shall establish and implement a system of internal and external compliance-based audits of quality assurance programs for TAPS quality-related structures, systems, and components. These audit activities shall include the preparation, performance, reporting, and follow-up of audits by both the auditing and audited organizations. The audit program and activities shall be described in approved, written policies, plans, procedures, instructions, checklists, or such other documents as appropriate.

1. Objectives

The stated objectives of the audit program shall be to:

1) determine that all facets of the quality assurance program have been developed and documented in accordance with the TAPS Agreements' regulatory requirements and commitments;
2) verify by examination and evaluation of objective evidence that the documented quality assurance program has been implemented;
3) assess the effectiveness of the quality assurance program;
4) identify and report nonconformances and quality assurance program deficiencies; and,
5) verify that remedial and lasting corrective actions have been taken for identified nonconformances and quality assurance program deficiencies.

2. **Audit Personnel**

The Manager, Quality Assurance, with input from the Lead Auditor, shall select and assign auditors and technical auditors (specialists) who are independent of any direct responsibility for performance of the activities which they will audit.

The Manager, Quality Assurance, shall establish the audit personnel qualifications utilizing the "point" system identified below. Personnel selected for quality assurance auditing assignments shall have experience or training commensurate with the scope, complexity, or special nature of the activities to be audited. Technical specialists who assist in the audit function need not be certified as auditors. They shall, however, require documented orientation to provide a working knowledge and understanding of the auditing organization procedures for implementing audits and reporting results.

3. **Audit Personnel Qualification**

The Manager, Quality Assurance, shall authorize auditor/lead auditor certifications by the Manager's signature.

Applicants for auditor certification shall have a minimum of five (5) points from the "Qualification Point Requirements" tabulation below.

Applicants for lead auditor certification shall have a minimum of ten (10) points from the "Qualification Point Requirements" tabulation below.

4. **Qualification Point Requirements**

Education -- four (4) credits maximum

1) undergraduate level
2) graduate level

Experience -- nine (9) credits maximum

1) technical (0-5 points) and
2) related industry (0-1 point) or
3) quality assurance (0-2 points) or
4) auditing (0-4 points)

Professional Accomplishment -- two (2) credits maximum

1) professional engineer
2) society

Management -- two (2) credits maximum

1) explain circumstances and
2) by whom evaluation was performed.

Associated areas also be to recognized and documented are an evaluation of audit communications skills as well as audit training courses attended and previous audit participation including location, audit number, and date(s) of the audit(s).

5. Audit Personnel Training

Auditors shall have, or be given, training or orientation to develop their competence for performing required audits. Competence of personnel for performance of the various auditing functions shall be developed by one or more of the following methods:

1) orientation to provide a working knowledge and understanding of the applicable TAPS Agreements, regulatory requirements, and commitments, and the quality assurance procedures for implementing audits and reporting results;
2) training to provide general and specialized understanding of audit techniques. General training shall include fundamentals, objectives, characteristics, organization, performance, and results of quality assurance program auditing. Specialized training shall include methods of examining, interviewing/questioning,

evaluating, and documenting specific audit items and methods of closing out audit findings; and,

3) documented on-the-job training, guidance, and counseling performed under the direct supervision of a Lead Auditor. Such training shall include planning, performing, reporting, and follow-up actions involved in closing audit findings.

All auditor/lead auditor certifications shall be supported by successfully completed examination. This examination may be oral, written, practical, or any combination. This decision shall be made with input from the Manager, Quality Assurance, depending on the background/experience of the individual.

The following criteria shall be applied:

1) An average score of 80 per cent with no less than 70 per cent for any test component shall be required for a passing grade.
2) Examinations for auditor/lead auditor certifications shall be administered and graded by the training instructor at the site/work location.
3) During the training and examination of applicants, the trainee shall be evaluated for communication skills. This evaluation shall be documented by the training instructor.
4) Applicants who fail the examination(s) shall not retake those examinations until additional retraining is completed as directed by the Manager, Quality Assurance.

Auditor and lead auditor certifications shall expire in two (2) years unless proficiency is maintained through involvement in the audit process, review and study of codes, standards, procedures, or participation in audit training programs.

1) The Manager, Quality Assurance, shall review the personnel files of auditors/lead auditors prior to expiration of certifications to determine if proficiency has been maintained.

2) Auditors/lead auditors who fail to maintain proficiency shall be recertified in accordance with this section's training requirements.

6. Audit Program Implementation

1) Preparation

Preparation shall include the development of an Alyeska Master Audit Program Plan (AMAPP). The AMAPP shall define as a minimum: the required segments of the quality assurance program to be audited (e.g.: design control; procurement; document control; instructions, procedures, and drawings; environmental program; control of purchased material, equipment, and services; special processes; inspection; operations; work control; testing; precision measuring and test equipment; handling, storage, and shipping; nonconformance control; corrective action; records); the regulatory requirements, codes, and standards each segment is to meet; the procedures to be audited which implement such commitments; and the scheduled frequency of each audit to be performed.

An individual audit plan describing each audit to be performed shall be developed by the lead auditor. This plan shall identify audit scope, the requirements, the activities to be audited, internal or external organizations to be notified, the applicable documents, the schedule, and written procedures, checklists, or audit worksheets.

One or more auditors shall comprise an audit team.

A Lead Auditor shall be selected and appointed by the Manager, Quality Assurance, as the audit team leader. The Lead Auditor responsibilities shall include selection of the audit team members, orientation of the team, coordinating the audit process, establishing the pace of the audit, assuring communications within the team and with the organization being audited, conducting an audit

entrance meeting with key members of the audited organization(s), participation in the audit performance, conducting an audit exit meeting with key members of the audited organization(s), and coordinating the preparation and issuance of audit reports. In selecting personnel for auditing assignments, consideration shall be given to special abilities, specialized technical training, prior pertinent experience, personal characteristics, and education.

The team leader shall assure that the audit team is prepared prior to initiation of the audit. Pertinent regulations, policies, procedures, standards, instructions, codes, prior audit reports, and the audit plan shall be reviewed by the audit team; sufficient time shall be provided for such review to assure that each auditor is prepared to participate in a thorough audit. The procedures, checklists, or worksheets shall be prepared to assure complete and orderly accomplishment of the audit.

Particular attention shall be directed toward an understanding of internal and external organization and contractual interfaces and responsibilities of the organization to be audited.

Involved organizations shall be notified in writing of a scheduled audit within a reasonable time before the audit is to be conducted, including the scope and schedule of the audit, the team leader, and the date and time of the audit entrance and exit meetings. Communication points of contact shall be defined for the audited organizations during the entrance meeting; in addition, the lead auditor shall discuss the audit scope, plan, and audit sequence, introduce the auditors, and plan the audit exit meeting.

Unannounced special or supplemental audits shall be performed of either internal or external organizations when trends adverse to quality are indicated or corrective action follow-up is necessary.

2) Audit Process

Procedures or checklists/worksheets shall be used to ensure depth and continuity of audits. These documents shall not, however, restrict the audit investigation (i.e., there shall be no undue restrictions placed on "pulling strings" until the end of the "string" is reached and all avenues have been pursued sufficiently to assure a thorough and complete audit) when findings raise further questions which are not specifically included.

Objective evidence shall be examined for compliance with quality assurance program requirements. Selected essential elements of the quality assurance program shall be audited to determine whether or not they are being correctly and effectively implemented.

When a nonconformance or quality assurance program deficiency is identified, the condition shall be documented on a nonconformance report and included in the quality assurance program for cause determination, including root cause analysis for significant or potentially significant conditions adverse to quality, and identification of corrective actions necessary to resolve the conditions adverse to quality and to preclude recurrence. Sufficient investigation shall be undertaken to assure proper determination of the significance of such conditions and to establish any trends. These findings shall be included in the quality assurance trending program. Observed conditions identified by the audit team which will enhance the quality assurance program or preclude further problems which could result in conditions adverse to quality shall be reported by the audit team and responded to by the audited organization(s).

If the preventative action is not implemented in a timely manner or a consensus on what the preventative action should be cannot be achieved, the QA organization shall be required to issue a Corrective Action Request (CAR) or a stop work order on the related process or activity. Such stop work order shall remain in place until consensus has been gained and corrective action has been implemented. Controlled, documented measures shall address the issue of timeliness directly, and provide clear guidance as to what is and is not timely for the various degrees of severity and the topics covered, so that quick action is assured for more severe deficiencies or adverse trends. In each case of severe deficiencies or severe adverse trends, the QA organization or upper management shall inform the BLM/JPO promptly by telephone or facsimile transmission with follow-up written notification within twenty-four (24) hours of the initiation of such stop work order. In no instance shall the perceived financial cost be allowed to outweigh the potential adverse impact on the health and safety of the public, employees and contract personnel, and/or the environment/ecosystem. In a worst-case scenario, this shall include the cessation of transport of oil through the pipeline until such time as the preventative action is implemented and such protection of the health and safety can be assured.

At the conclusion of the audit process, an audit exit meeting shall be held with key members of the audited organization(s), including management, to present audit findings and observations and to clarify, avoid, and/or minimize any potential misunderstandings.

3) Audit Reporting

An audit report, signed by the audit team leader and the Manager, Quality Assurance, shall be prepared promptly following each audit. The final audit report shall include, as a minimum:

a) a description of the audit scope;

b) identification of the auditors and technical specialists;

c) persons contacted during the audit entrance meeting, the audit process, and the audit exit meeting;

d) an executive summary of the audit results, including findings and observations, and a statement regarding the effectiveness of the quality assurance program elements which were audited;

e) a description of each nonconforming condition, identified in sufficient detail to assure that corrective action can be effectively carried out by the audited organization; and

f) recommendations for enhancing the quality assurance program.

Distribution of the report shall include responsible management of both the audited and auditing organizations. The audit report shall be issued within thirty days after the audit exit meeting.

4) Audit Report Follow-Up

Nonconforming reports for hardware and programmatic conditions adverse to quality shall be promptly dispositioned with remedial action taken, cause and corrective actions to preclude recurrence identified and implemented, and follow-up corrective action verified through supplemental audits or surveillances. Audit observations shall be responded to by the audited organization(s) and submitted to quality assurance for acceptance and verification within thirty days of receipt of the final audit report.

5) Records

Records shall be maintained by quality assurance as quality records. Records shall include the audit plan, completed checklists/worksheets, audit reports, completed nonconformance reports, written replies, and the record of verified completion of corrective actions, including root cause analysis reports when required.

Records shall include documentary evidence of the qualifications and training of auditors and technical specialists and shall be retained as quality records.

6) Audit Program Essential Elements

An effective and efficient audit program shall be established and maintained and shall include, as a minimum, the following essential elements:

a) an Alyeska management policy statement or procedure which establishes organizational independence, freedom, and authority of the auditors to report conditions adverse to quality and which commits Alyeska to an audit program which meets the TAPS Agreements, regulatory requirements, and commitments;

b) manpower, funding, and facilities to implement the audit program;

c) identification of those responsible for the audit program, including a delineation of their authorities, responsibilities, and organizational independence;

d) provisions for reasonable and timely access of audit personnel to facilities, documents, and personnel necessary in the planning, performance, and follow-up of the audits;

e) provisions for reporting on the effectiveness of the quality assurance program to the responsible management of both the audited (internal and external) and auditing organizations;

f) provisions for access by audit teams to levels of management of the auditing and audited organizations which have the responsibility and authority to assure lasting corrective action; and

g) provisions for responses and verifications of effective and lasting corrective action on a timely basis.

7) Audit Planning

The audit program, including both internal and external audits, shall be planned, documented, coordinated with audit team members, and conducted to assure complete coverage of the essential elements of the applicable quality assurance program, and overall coordination and scheduling of audit activities. The audit program shall be periodically reviewed, and revised as necessary, to assure that audit element coverage and schedule reflect current activities.

8) Audit Scheduling

Internal and external audits shall be regularly scheduled on the basis of the status and importance of the activities to assure the adequacy of, and conformance with, the audit program.

Regularly scheduled audits shall be supplemented by audits for one or more of the following conditions:

a) to assess the capability of a contractor's or vendor's quality assurance program prior to awarding a contract or purchase order;

b) when, after award of a contractor purchase order, sufficient time has elapsed for implementing the quality assurance program and it is appropriate to determine that the organization is adequately performing the function as defined in the quality assurance program description which incorporates the TAPS Agreements, regulatory requirements, codes, standards, and other Alyeska commitments;

c) when significant changes are made in functional areas of the quality assurance program such as significant reorganization or procedure revisions;

d) when trending indicates that programmatic or hardware deficiencies in the quality of an item, process, or program effectiveness exist which place that segment of the quality assurance program in question or jeopardy; or

e) to verify lasting implementation of required corrective action.

SURVEILLANCES

Alyeska shall establish and implement a system of internal and external performance-based surveillances of quality assurance programs for TAPS quality-related structures, systems, and components. These surveillance activities shall include the preparation, performance, reporting, and follow-up of surveillances by both the surveillance function and the surveilled organization. The surveillance program and activities shall be described in approved, written policies, plans, procedures, instructions, or checklists.

1. Objectives

The stated objectives of the surveillance program shall be to:

1) assess the in-process control and effectiveness of the quality assurance program;
2) identify and report nonconformances and quality assurance program efficiencies; and,
3) verify that remedial and lasting corrective actions have been taken for identified nonconformances and quality assurance program deficiencies

2. Surveillance Personnel

The Manager, Quality Assurance, shall select and assign surveillance personnel who are independent of any direct responsibility for performance of the activities which they surveil.

The Manager, Quality Assurance, shall establish the qualification requirements for surveillance personnel as defined below. Personnel selected for quality assurance surveillance assignments shall have experience or training commensurate with the scope, complexity, or special nature of the activities to be surveilled.

3. Surveillance Personnel Qualifications

To be considered for qualification, surveillance candidates must satisfy one of the following requirements:

1) graduate of a two-year accredited engineering or science college or university, plus two years of experience in quality assurance including testing or inspection (or both) of equivalent construction, installation, or operation related to pipeline requirements; or
2) high school graduate, plus four years of experience in testing or inspection (or both) of equivalent construction, installation, or operation related to pipeline requirements.
3) graduate of a four-year college with 6 months experience.

4. Surveillance Personnel Training

Surveillance personnel shall have, or be given, training to develop their competence for performing surveillances. Training shall include:

1) the applicable TAPS Agreements, regulatory requirements, and commitments, and the functional organizations and the quality assurance procedures associated with the specific surveillance.

5. Surveillance Process

Surveillances usually shall be unannounced activities conducted by surveillance plans, checklists, or worksheets.

When a nonconformance or quality assurance program deficiency is identified, the condition shall be documented on a nonconformance report and included in the quality assurance program for cause determination, including root cause analysis for significant or potentially significant conditions adverse to quality, and identification of corrective actions necessary to resolve the conditions and to preclude recurrence.

Controlled surveillance reports, signed by the surveillance representative(s), and the Manager, Quality Assurance, shall be prepared promptly following each surveillance activity. The report shall include, as a minimum:

1) a description of the surveillance performed;
2) identification of the surveillance personnel involved in the surveillance;
3) findings including nonconforming conditions; and,
4) recommendations for enhancing the quality assurance program if applicable.

Distribution of the report shall include responsible management of both quality assurance and the functional manager of the operation surveilled.

CORRECTIVE ACTION PROGRAM VERIFICATION

The QA organization shall assure that controlled measures are developed and implemented to audit and survey the corrective action program and the preventative corrective actions which have been implemented. These measures shall assure that the requirements and intents set forth in this section have been adequately and accurately translated into implementing procedures and that the implementing procedures are being accurately implemented. They shall further assure that any revisions to the implementing procedures continue to meet the requirements and intent set forth in this section. Since this program is central to problem resolution, it shall be reviewed, audited, and surveyed at frequencies substantially above those used for other activities.

VERIFICATION OF CONTROL OF DOCUMENTS

A comprehensive system of planned audits and surveillances shall be carried out to verify compliance with all aspects of the Quality Assurance program for the control of documents. The audit/surveillance process shall verify that only current and controlled documents are being used at the various TAPS work locations.

VERIFICATION OF QUALITY RECORDS RETENTION

An audit system shall be established to assure that the quality records storage system, as discussed in Section 17, is effective. The following shall be performed as a minimum:

1) periodic surveys to assure that records logged in are available and have been placed in their proper location within the files, and to assure that the control system is adequate;
2) periodic audits to assure that the facilities are in good condition and that the temperature/humidity controls and protective devices are functioning properly;
3) periodic audits of the records to assure that the documents are not deteriorating due to improper storage practices or rough handling;
4) periodic audits to provide the above assurances for records retained by contractors/ suppliers/vendors; and
5) when required, unannounced audits of both Alyeska and contractors/suppliers/vendors to assure that these organizations are in compliance with the requirements for quality records set forth in this section.

VERIFICATION OF PROCEDURES AND INSTRUCTIONS

A comprehensive system of planned and documented audits and surveillances shall be carried out by quality assurance to verify compliance with all aspects of the Quality Assurance program for the development, maintenance, revision, implementation, and document and records control of implementing procedures and instructions.

VERIFICATION OF COMPLIANCE WITH MAINTENANCE REQUIREMENTS

Alyeska quality assurance shall perform audits and surveillances at the various TAPS locations where maintenance activities are being performed in order to verify compliance with the minimum requirements set forth in this report. Additionally, safety and fire protection and environmental monitoring personnel shall perform periodic surveillances to verify compliance with safety and environmental requirements during maintenance activities.

VERIFICATION OF COMPLIANCE WITH EMISSION MONITORING PROGRAM

A comprehensive system of planned and documented audits and surveillances shall be carried out by quality assurance to verify that the emission monitoring program is implemented in accordance with specified criteria, including any additional requirements specified in the implementing procedures.

QA-36, Section 19, Training

Reference: Final Report of Audit on Behalf of BLM of the Trans-Alaska Pipeline System (TAPS) by Quality Technology Company (QTC), Executive Summary pages 36 and 62; XI.E. pages 1-6; and Section XIII.A. page 1.

Alyeska shall develop, document, maintain, and implement a TAPS project indoctrination and training program for all Alyeska employee and contractor personnel performing activities affecting quality-related structures, systems, or components to assure that the required proficiency, qualification, and certification are achieved and maintained.

1. Training Program Scope

The indoctrination and training program shall apply, as a minimum, to project personnel who perform: at all levels of management; designing; purchasing; fabricating; planning; maintaining; calibrating; shipping; storing; cleaning; erecting; installing; modifying; inspecting; auditing; surveilling; examining; operating; and, testing.

The program shall provide for additional simulated and mock-up training to qualify processes and personnel operating under harsh environmental conditions and such complex and/or difficult applications required to accomplish the activity. The training program shall take into account special controls, processes, test equipment, tools, and skills to attain the required quality level. Contractors with their own training programs shall meet the provisions of the Alyeska training program and shall maintain their personnel training records.

The program shall provide for a feedback mechanism from the various project user organizations to enhance the training program or retrain personnel which result from activities such as the lessons learned program, trending reviews, nonconformance reports, audit and surveillance reports, field action requests, stop work orders, corrective action

requests, trouble tickets, root cause analysis reports, preventive and corrective maintenance work orders, environmental reports, or regulatory inspection reports.

2. General Requirements

The Alyeska TAPS functional managers shall be responsible for defining indoctrination and technical training requirements for their respective organizations and for assuring that such requirements are adequate and sufficient to properly perform project activities within their responsibilities.

The training schedule shall reflect anticipated project activities to allow adequate time for required training of personnel. A TAPS-required indoctrination and training program plan and schedule shall be developed, documented, maintained, and implemented which identifies training requirements for all activities which deal with quality-related topics.

The program shall provide for the in-process analysis of the effectiveness of existing indoctrination and training activities, and the need for changes or additions. Regular status reports to responsible management shall be developed and issued to keep management aware of the effectiveness of the indoctrination and training program and to indicate any deficiencies among TAPS project personnel in completing required training courses.

Training instructors shall be qualified and certified to develop training plans and modules, conduct the training course, and evaluate the results.

Training instructors shall be required to perform periodic assessments of the effectiveness of the training program by observing actual field work activities and conditions to verify that the training concepts, scope, and content of the training performed were adequate for the activity and that the training is being implemented as intended.

As a minimum, training shall encompass multi-media or self-study presentations, formal classroom training, or on-the-job training. Training shall include proficiency testing where required to determine the capability and proficiency of personnel who perform activities affecting quality.

The training program shall include, but not be limited to: mandatory training encompassing the quality assurance program and regulatory requirements; safety and security; qualification and certification of personnel for special processes, inspection, and testing; maintenance and calibration; equipment and operator qualification; root cause analysis; supervisory and management training; and special work activities.

Completion of all required training for personnel who perform activities affecting quality shall be documented. Training records shall be developed and maintained and be readily retrievable. Training records for all Alyeska employees and contractors with training records shall include, as a minimum:

1) type of training;
2) course material and documentation presented or reviewed;
3) a training/indoctrination participant roster;
4) department or contractor name;
5) name of the participant;
6) employee/contractor number or social security number;
7) position title;
8) date hired;
9) education and experience;
10) date(s) trained;
11) examination score;
12) certificate of qualification;
13) proficiency evaluation record;

14) comments; and

15) instructor's typed or printed name, signature, and date.

3. **Monitoring**

Quality assurance shall perform audits and surveillances to verify the implementation of a documented, controlled, and effective TAPS project training program which meets quality assurance program requirements.

Safety and environmental personnel shall review applicable aspects of the training program to assure that applicable regulatory requirements are being effectively and completely included in the training program and that the training as implemented is in compliance with those training requirements.

4. **State Certificate Of Fitness - Electrical**

a. External Certifications

The QA organization shall develop controlled measures to verify and assure that when reliance is placed on non-Alyeska certifications, such as the state certificate of fitness, that:

1) the basis of the certification program is adequate;

2) the certification program is controlled so that, at minimum, adequate measures exist for assuring that the holder of the certificate actually possesses the knowledge, skills, or abilities set forth in the certification program;

3) the certification program is reviewed, audited, and found to meet Alyeska's needs;

4) copies of the documented program are in Alyeska's possession and readily retrievable;

5) for quality-related activities, that knowledge, skills, and abilities are monitored and assessed to assure continued adequacy of performance; and,

6) continued training is administered sufficient to maintain proficiency for quality-related or important to quality activities.

b. External Inspector Certifications

If an external certification program is used for inspection or test personnel, in addition to meeting the requirements in 1., the QA organization shall develop controlled measures to verify and assure that the external program and supplemental training program meet the minimum qualification requirements set forth in Section 13, Inspection and Testing.

QA-36, Page xv, Definitions of Terms

The following definitions (in addition to those already included in QA-36, page xv) apply to the Alyeska QA program:

1) **Audit Finding** - An observed condition adverse to quality to which the audited organization must respond with cause determination and corrective action.
2) **Audit Observation** - A condition which an auditor considers appropriate to call to the attention of the audited organization, even though at the time it is not an audit finding.
3) **Checks** - The tests, measurements, verifications, or controls placed on an activity by means of investigations, comparisons, or examinations to determine satisfactory condition, accuracy, safety, or performance.
4) **Compliance** - Cooperation, implementation, and verified conformance by Alyeska and the owners of the pipeline with the terms and conditions already contained in the agreements between the owners and state and federal regulatory bodies (more specifically, with the terms and conditions of the Agreement and Grant of Right-of-Way for the Trans-Alaska Pipeline between the United States of America and the Owner Companies, dated January 23, 1974, Section 9, Construction Plans and Quality Assurance, as further clarified and enhanced by this QTC report), as well as any and all other federal, state, local, or other applicable laws, regulations, agreements, or requirements imposed upon Alyeska.
5) **Conclusions** - Statements which are evaluative or demonstrate cause-effect relationships. Conclusions are supported by facts.
6) **Contributing Factors** - Those conditions and events which, in combination with the root causes, increase the severity of the consequences of an event or adverse trend or otherwise change the outcome of an event or adverse trend.
7) **Design Control** - The assurance that applicable regulatory requirements and the design basis for those quality-related structures, systems, and components are correctly translated into specifications, drawings, procedures, instructions, manuals, and technical bulletins.

Included is the assurance that appropriate quality standards are specified and incorporated into design documents and that deviations from such standards are controlled.

8) **Documentation** - Presentation of written or documentary information, supporting data, and statements. Such documentation includes, but is not limited to: documents prepared in the usual course of business and operation of the pipeline (e.g., various types of deficiency paper, audit reports, special internally produced or externally produced reports on specific issues); references to published information; citations from the presenter's experience; and reference to unpublished information developed by the presenter or the presenter's consultants. Where documentation is submitted as supporting evidence, the presenter should make clear whether the supporting evidence is based on theoretical, laboratory, on-site, or field studies undertaken on this or on previous occasions. Statements which are not supported by documentation may be acceptable provided the presenter accurately identifies them either as information for which documentation is not available or as expressions of belief or judgement; appropriate weight will be given to such statements.

9) **Ecosystem** - The system formed by the interaction of the community of any and all life forms and organisms in combination with their environment in the areas comprising or adjacent to, and which could be affected by any aspect (e.g., normal operation, spills, accidents) of, the pipeline.

10) **Engineering Limitations** - Restrictions which, if disregarded, may result in damage to the item, shortening the life of the item or preventing the item from functioning as intended.

11) **Equipment Qualification Master List (EQML)** - The accumulation and listing of all structures, and components requiring environmental and/or seismic qualification.

12) **Examination** - An element of inspection consisting of investigation of materials, components, supplies, and services to determine conformance to those specified requirements which can be determined by such investigation. Examination is usually nondestructive and includes simply physical manipulation, gauging, and measurement.

13) **External Design Interface** - Relationship between design groups from different Alyeska contract companies.

14) **Facts** - Statements which are verifiable and objectively stated.

15) **Final Design** - Approved design output documents and approved changes thereto.

16) **Internal Design Interface** - Relationship between discipline design groups within Alyeska.

17) **Initiating Event** - The event(s) starting the immediate chain of occurrences which led to the discovery of the event.

18) **In-Process Exception** - A procedurally defined and limited exception to the nonconformance reporting requirements which would allow work to continue on a nonconforming item or activity. It shall be processed in accordance with approved engineering disposition to return the item or activity to drawing and specification conformance. The item or activity for which the exception is utilized must be under the direct control of a procedural instruction such as those used to perform maintenance or testing. The procedure or instruction must specifically define the limits of the exception for the specific item or activity.

19) **Inspection** - An examination or measurement to verify whether an item or activity conforms to specified requirements.

20) **Master Equipment List (MEL)** - The accumulation and listing of all structures, systems, and components comprising the TAPS.

21) **Modification** - A planned change in the TAPS design or operation and accomplished in accordance with the requirements and engineering limitations of applicable TAPS Agreements, stipulations, codes, standards, specifications, and predetermined quality and safety restrictions.

22) **Procedure** - A document which includes, as required, responsibilities, qualifications, how an activity is to be performed and inspected, including methods to be used, prerequisites, equipment or materials to be used, sequence of operations, cautions, notes, and criteria.

23) **Q List** - The list which accumulates and identifies all quality-related structures, systems, and components.

24) **Quality-Related** - Those structures, systems, and components which prevent or mitigate the consequences of an accident which could cause risk to safety, pipeline integrity, or the environment.

25) **Remedial Action** - The action taken to correct reported discrepancies and include similar action on additional like items completed or in-process.

26) **Root Cause Analyses** - The scientific and logic methods utilized for the consistent TAPS-wide application of investigative methods and analyses techniques for the evaluation and determination of undesirable conditions, equipment and process failures and incidents or trends which are significant conditions adverse to quality. They provide for a means of recommending effective and lasting corrective actions to preclude recurrence of similar events.

27) **Root Causes** - The causes which by themselves or in combination lead to the occurrence of an event or trends which are significant conditions adverse to quality.

WALTER J. HICKEL, GOVERNOR

STATE PIPELINE COORDINATOR'S OFFICE

☐ **Department of Environmental Conservation**
☐ **Department of Natural Resources**
☐ **Department of Fish and Game**

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Letter No.: 93-180-M
File No.: (51) 3.10.9

December 29, 1993

Mr. Owen Thero
President
c/o Juanita Ellis
Quality Technology Company
1426 South Polk
Dallas, Texas 75224-1306

Re: **Comments on QTC**

Dear Mr. Thero:

The purpose of this letter is to offer JPO's comments on draft Recommendations for corrective actions needed for Trans-Alaska Pipeline. This response consolidates our earlier reviews of the Draft Report and also includes our understanding of commitments, comments, and changes to the Draft Report as discussed during the meeting held in Anchorage on December 15, 1993 between JPO, QTC and APSC. It is our understanding that previous letters (with attachments) offered as comments by the JPO on rough draft materials will not be included in the Final QTC Report.

JPO understands the following:

1. It was agreed to in the December 15, 1993, meeting that the JPO would draft language for an introduction or transmittal letter. Listed below is the recommended language to be inserted inside the report cover as the statement:

INTRODUCTION

The recommended practices and procedures presented in this report are intended to insure and support the application of codes, standards and regulations promulgated for hazardous liquids pipeline. The practices and procedures recommended are intended to provide a mechanism to achieve excellence in insuring the intent and purpose of Section 9 of the Right-of-Way Grant and Section 16 of the State Lease are accomplished.

Recommended practices and procedures identified in this report will be evaluated in conjunction with the findings and recommendations of all previous TAPS audits. A risk based cost benefit analysis is an essential element of proposed corrective actions prior to implementation.

2. All references to the word "Regulatory Requirements" will be deleted from the report. The report should be retitled "Recommended Practices". The "Recommended Practices" will be evaluated under the Phase III process for implementation. The State of Alaska and Federal regulatory agencies are required to follow "due process" when developing requirements that affect the public.

3. The JPO understands that all references to cost estimates in the Phase II report will be removed since they do not reflect actual costs expected to be incurred.

4. The JPO understands that specific Phase II recommendations will be used for developing the specific processes and practices of APSC's Quality Program. Examples such as Q-list and as-builts will be categorized for implementation by pipeline experts in conjunction with the JPO. The JPO will be using safety, environmental protection and pipeline integrity criteria as the basis for their in depth review of the "Recommended Practices" to a Quality Assurance Program. The JPO pipeline staff and Alyeska will determine the extent of implementation of the Phase II recommendations.

5. We have provided separately a copy of Alyeska's comments on the draft Phase II report. These comments shall be included in the Final Phase II report with appropriate attribution to APSC per instructions from the Contracting Officer's Representative.

Based upon technical meetings held with Mr. Hill, Mr. Williams, and Dr. Schroeder respectively:

The JPO understands the following:

1. Girth Welds:

   - The Site Engineers will visually inspect girth welds for corrosion when exposed during the Corrosion Inspection Program. If corrosion is found, the Engineer will have the girth welds measured with a pit gauge and document the findings and measurements on form 3619-2 (Mainline Pipe Investigation Report). Written procedures for the site engineers are provided in Alyeska Technical Specification B-510 to measure and examine corrosion:
     1. External metal loss of the weld cap
     2. Circumferential external corrosion between the pipe and the weld metal interface.

   - Documentation specifically for external examination of girth welds will be included in the Alyeska Engineering Corrosion Data Base. Documentation will be based on the pipe stationing for each girth weld. Data of measured corrosion and site engineer recorded visual examinations will be documented. A engineering

review of this data will be completed and documented by Operations Engineering on a quarterly basis or more frequently if necessary.

- Internal examination findings of girth welds will be recorded in the Corrosion Data Base whenever the internal wall of the pipe is available for visual inspection. These opportunities are limited to pipe abandonment or pipe cutouts for maintenance or replacement and the examination is required by Department of Transportation CFR 195.418(d).
- Alyeska will provide documentation for the internal and external condition of the girth weld areas from the three 48 inch check valves removed from the Atigun Floodplain Pipe Replacement.
- Alyeska engineering will specifically identify the concern of metal loss in the girth weld to the corrosion pigging contractors and develop detection and reporting methods to identify girth weld corrosion to the fullest extent afforded by present technology.
- Alyeska engineering is committed to working with pigging contractors to explore future technological improvements to improve the detection and reporting capabilities of metal loss in girth welds.

2. **Electrical Deficiencies**
Electrical Deficiencies are under the authority of Alaska Department of Labor and it is their responsibility to determine if there are violations of the law or code. Any reference to violation should state "Alleged Violation" - APSC should continue their inspection program, and engineering the fixes as is "in progress" and in compliance with the APSC current stop work order. A work plan and QA enhancements will be developed by Alyeska and approved by JPO to systematically track and assure all "alleged" violations are addressed and remediated as required.

3. **VSM Issue**
The mainline insulation jackets touching the VSMs will have their design criteria checked against current earthquake engineering methodologies to verify that existing design calculations and assumptions are correct. Appropriate steps will be developed to correct any identified deficiencies.

The following comments are offered based upon review of the Draft Report:

1. No Definitions Page was included in the copy of the Draft Report furnished by QTC as noted in the Table of Contents, Page TOC-9.

2. There is no agreed upon definition for the words "ecosystem" and "compliance". These words have different meanings to different readers and should be deleted.

3. Spell out the words to M & TE program found on Page 5, Introduction, Item 9.

4. The section on "Upgrading the Electrical System...", Pages 7 through 10 would be more

readable if the Quality Assurance Manual requirements were removed and placed elsewhere in the report. Perhaps it could be placed as a separate section in the introduction to provide for its importance independent of any systems upgrades. The QA requirements apply to all programs system-wide not just electrical.

5. Delete the title "Introduction" on Page 10 of Introduction. This addition adds confusion if not consistently applied, i.e., none for electrical system section.

6. The last sentence in the first paragraph of Page 11, Introduction is not clear. What is meant by "..in the following?"

7. Subjective comments regarding Alyeska performance etc., should be removed.

Recognized Exclusions

1. There is no regulatory matrix which ties recommendations of this report to specific regulatory requirements, laws, codes, Right-of-Way stipulations, etc.

2. Specific regulation references for each specific recommendation are not cited and recommendations cited are too general.

JPO appreciates your cooperation and coordination in the preparation of the Phase II report.

Sincerely,

STATE PIPELINE COORDINATOR'S OFFICE

for R.L. Odsather
Jerry Brossia
State Pipeline Coordinator

BUREAU OF LAND MANAGEMENT

Donald E Keyes
for Nolan Heath
Chief, Branch of
Pipeline Monitoring

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Alyeska Comments

Attachment 2

Comments by Section of Proposed Revisions to Quality Program

General Comments:

If the JPO directs Alyeska to amend Alyeska's Quality program, the new program should be made effective upon a mutually agreeable date, and shall not be retroactive.

In many sections the itemized listings are preceded by the terms "as a minimum" or "at a minimum", which we believe to be unnecessary for pipeline industry application, and should be replaced with "as appropriate" or "as applicable"; example, Section 2, Quality Program Description, pages 3, 4, and 5. Alyeska intends to use quality level of items on the Q list such as Q1, Q2 and Q3 to determine what is appropriate or applicable. For example all items listed under "as minimum" may apply to Q1 items but only some may apply to Q2 items.

Introduction: (DRAFT Rev. 1. 12/12/93)

Page 14, first paragraph: Only three of the seven methods listed in OSHA 1910.119 are included in the draft. We question the value of the proposed limitations in excess of the regulatory requirements. Include other methods: "what if," "checklist", "what if/checklist", and "an approved equipment methodology".

Section 1: Management Responsibilities (DRAFT, Rev. 7, 12/11/93).

Page 7, item 12: the extent to which the Quality, Environmental, and Safety organization is responsible for the TAPS training program is being evaluated.

Section 2: Quality Program Description (DRAFT, Rev. 14, 12/11/93).

Page 26, subsection 6.2, Mainline Pipe Girth Welds: This provides excessive detail for in-service inspection without commensurate added value. Some of these requirements are beyond current technology. Alyeska is exploring appropriate resolution of this issue through the cooperative program.

Page 30, "Gas Emissions and Monitoring": we have the following comments.

- We disagree with the finding that gas emissions from either the Terminal or the Pump Stations represents a threat to pipeline integrity, safety, or the environment. We feel there is no potential for a threat to the general public, and have done studies to demonstrate this.
- There is no regulatory basis for the gas emission monitoring proposed in the QTC recommendations.
- This item requires review with the JPO.
- It is not physically possible to monitor on a continuous basis as proposed.

- **There is no scientific basis or measurable limit to determine what constitutes a "noxious level".**
- **This requirement is too broad and cannot be applied to all areas.**

Section 9: Procurement (DRAFT Rev. 7, 12/12/93)

Page 3, 1st paragraph, last line; change "least two" to "one or more of". This is an example of going beyond NQA-1 requirements, which reads "one or more of".

Section 12: Special Processes (DRAFT Rev. 2, 12/12/93)

Page 1, 2nd paragraph: delete "castings, chemical cleaning, concrete and grouting" from the list of special processes. This is another example of going beyond NQA-1. We are in the process of contacting ASNT regarding applicability of pig programs as a special process under the standard for non-destructive testing, SNT-TC-1A.

Section 16: Corrective Action (DRAFT Rev. 6, 12/12/93)

Page 7, last paragraph and page 8: requires analysis of each deficiency since 1990 and should be deleted. We believe that it is excessive especially in view of the fact that significant changes to the entire quality program are being made as a result of BLM and Alyeska internal audits.

Section 17: Quality Records (DRAFT Rev. 1, 12/12/93)

Page 3, under "Technical Requirements": delete "certified true" in last sentence.

Page 4: requirements for retaining hard copies for 5 years in item 7 and 2 years in item 8 in addition to computerized records appears to go beyond NQA-1 requirements without any particular justification. Suggest deleting it.

Section 19: Training (DRAFT Rev. 4, 12/12/93)

Page 4: State Certificate of Fitness: suggest deleting this entire section because it requires Alyeska to audit the State of Alaska which should be done perhaps by the JPO or specifically the BLM. This requirement appears to place excessive burden on Alyeska.